BIBLIOGRAPHY of Technical Reports

October 12, 1961
Vol. 16, No. 4

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NEWSLETTER INSERT FOLD

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UNITED STATES DEPARTMENT OF COMMERCE
Charles Sawyer, Secretary

OFFICE OF TECHNICAL SERVICES
John C. Green, Director

October 1951

RESEARCH ON FOOD AND INDUSTRIAL USES OF DAIRY BYPRODUCTS

The best possible use of milk is as food, and the best way to obtain its full nutritional value is to consume the whole milk in its liquid, concentrated, or dried forms -- either as a beverage or in cooked foods. But when more milk is produced than can be used in its whole form, the surplus is made into butter or cheese, leaving as byproducts vast quantities of skim milk, buttermilk, and whey.

Since these byproducts contain some of the most valuable nutrients of the original milk -- proteins, sugar, minerals, and vitamins -- it is highly desirable that they also be used as human food. Research workers are constantly finding new ways to increase the use of skim milk, buttermilk, and whey or their constituents in food manufacture, but large quantities are still fed to animals or wasted.

Some of the constituents of skim milk and whey, such as the casein and lactose, are useful in making industrial products. 1/

1/ Whittier, Earle O. Dairy byproducts. U. S. Dept. Agr. Yearbook 1943-47 (Yearbook Sep. 1972): 716-721. 1947.

Use of fluid skim milk in chocolate milk and cultured buttermilk is well known. Conversion of skim milk into cottage cheese conveniently concentrates the protein for easier distribution and for marketing in a more popular form. Skim milk in its concentrated forms is a convenient source of nonfat milk solids in ice cream. While the use of fluid skim milk in bread and other bakery products is limited largely because of its perishability and bulk, plain and sweetened condensed skim milk are popular source of milk solids. Nonfat dry milk is most generally preferred for incorporation in foods because of its excellent keeping quality and high concentration. 2/ Milk solids in bakery formulas improve the flavor, nutritional properties, keeping and toast-

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2/ Holm, G. E. Dried milks. U. S. Dept. Agr., Agr. Res. Admin., Bur. Dairy Industry, BDIM-Inf-25, 12 pp., revised 1949. (Processed).

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ing qualities, and yield per batch of dough. 3/

3/ Rogers, L. V. Milk products in commercial bakery goods. U. S. Dept. Agr., Agr. Res. Admin., Bur. Dairy Industry BDIM-Inf-107, 12 pp., 1950. (Processed).

Experiments in using both skim milk and surplus potatoes have produced a wafer with cheese-like flavor and the texture of potato chips. Having no fat, the wafers will keep for a year or more. The procedures in-

4/ Webb, B. H. Utilization of skim milk in a new potato product. Food Indus. 12(5): 48-49. 1940.

volved suggest many similar products. 4/ The tendency of skim milk to foam when it is agitated can be utilized in preparing home-made fruit whips, useful in restaurant kitchens.

Casein from skim milk is suitable for manufacture of buttons, umbrella handles, and other plastic products. High-quality casein is important in paper-coating. Newer industrial uses for casein are the fabrication of synthetic rubber and an artificial fiber that is taking a definite place among our textile fibers. The popular and relatively new water-emulsion paints usually contain casein for its emulsifying action, but the casein also acts as a binder. The use of the insecticide DDT in water-emulsion paints is expected to increase the market for casein.

Although only a small quantity of casein is used in synthetic rubber, this use is important as no adequate alternative substance has been found. The casein acts as an internal lubricant to prevent excessive heating of tires.

Casein has long been used for bonding, finishing, and waterproofing fabrics, but in recent years there has been commercial development from casein of an artificial fiber and bristle. 5/ The first of eight patents re-

5/ McMeekin, T. L., Reid, T. S., Warner, R. C., and Jackson, R. W. Artificial bristles from proteins. Indus. and Engin. Chem. 37:685-88. 1945.

sulting from research in the Bureau of Dairy Industry was issued in 1939, and since then other inventors have

6/ Peterson, R. F., McDowell, R. L., and Hoover, S. R. Continuous-filament casein yarn. Textile Res. Jour. 18(12): 744-48. 1948.

obtained about 40 additional patents. 6/ Most felt hats contain some casein fiber as do some garments and fabrics. 7/ 8/

7/ Whittier, Earle O., and Richardson, L. S. Textile fiber made from casein of skim milk. U. S. Dept. Agr., Agr. Res. Admin. Res. Achvt. Sheet R.A.S. 22(D), 2 pp., 1945. (Processed).

8/ Peterson, R. F., etl al. Textile fiber from casein; factors affecting the tensile strength. Indus. and Engin. Chem. 37:492-96. 1945.

Uses for buttermilk are similar to those for skim milk. Sweet-cream buttermilk is acceptable for use in ice cream and frozen desserts. The lecithin fraction of the cream is said to improve the whipping ability and flavor of certain ice creams. 9/

9/ Williams, D. H., Potter, F. E., and Hufnagel, C. F. Concentrated buttermilk in ice cream. Jour. Dairy Sci. 33(8):593-598. 1950.

Dried whey is widely used in feeding chickens. Although whey contains fat, lactose, highly nutritious proteins, minerals, and vitamins, little is consumed as food except as a component of other foods. 10/

10/ Webb, B. H., and Whittier, E. O. The utilization of whey. U. S. Dept. Agr., Agr. Res. Admin., Bur. Dairy Industry BDIM-Inf-49, 4 pp., 1947. (Processed).

Fluid whey can be combined with vegetable juices, such as tomato juice, to improve their food value, and with tomatoes, peas, or beans to produce soups. Sweetened condensed whey, a new product, provides in a cheap non-perishable form whey solids to be used wherever sugar is also needed. It is good making fudge and other candies 11/ 12/ and is used successfully in canned puddings. 13/ Dried whey is used in canned

11/ Webb, B. H., and Hufnagel, C. F. Whey solids in candy. Food Res. 5(2): 185. 1940.

12/ Hall, H. H., and Fahs, F. J. Milk solids give candies longer-lasting freshness. Food Indus. 21:1042-43. 1949.

brown bread, bakery goods, 14/ and sherbets. 15/ Concentration of whey causes the lactose to crystallize and

13/ Browne, H. H., and Webb, B. H. Canned whey pudding - a new product. Food Indus. 13: 36-38, 96. 1941.

14/ Rogers, L. V. Formulas for the commercial use of whey in bakery goods. U. S. Dept. Agr., Agr. Res. Admin., Bur. Dairy Indus. BDIM-Inf-89, 4 pp., 1950. (Processed).

15/ Potter, F. E., and Williams, D. H. Formulas for making sherbets with whey on a commercial scale. U. S. Dept. Agr., Agr. Res. Admin., Bur. Dairy Indus. BDIM-Inf-88, 2 pp., 1950. (Processed).

produce a bright yellow sugar that can be added to bread and other foods to increase their riboflavin content. Recently the Bureau of Dairy Industry announced a new and successful method for converting the protein in whey by hydrolysis into an important ingredient in making spreads and other foods requiring a smooth, mild base or filler. 16/

16/ Malkames, James P., Jr., Walter, Homer E., and Sager, Oscar S. Enzymatic hydrolysis of whey protein for use in foods. U. S. Dept. Agr., Agr. Res. Admin., Bur. Dairy Indus. BDIM-Inf-118, 4 pp., 1951. (Processed).

Lactose made from casein whey has been used for many years in infant foods. More recently, need for lactose in producing penicillin stimulated Department of Agriculture research to increase the supply by making lactose from cheese whey. Six practical methods resulted. 17/

17/ Webb, B. H., and Ramsdell, G. A. The manufacture of crude and technical lactose from cheese whey. Natl. Butter and Cheese Jour. 35(7):18-24; 35(8):18. 1944.

Fermentable sugar in dairy byproducts can be used in the production of alcohol and organic acids. Alcohol from whey is converted commercially into vinegar. Lactic acid is the only organic acid being produced

directly from whey by commercial fermentation. 18/ To find new uses for it, procedures have been develop-

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18/ Whittier, Earle O., and Richardson, L. S. Continuous process for making lactic acid from whey. U. S. Dept. Agr., Res. Achvt. Sheet R. A. S. 30(D), 2 pp., 1945. (Processed).

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ed to convert the lactic acid to acrylates. When polymerized 19/ these are flexible, glass-like substances

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19/ Fisher, C. H., and Filachione, E. M. Lactic acid -- versatile intermediate for the chemical industry. U. S. Dept. Agr., Agr. Res. Admin. Bur. Agr. and Indus. Chem. AIC-178, 16 pp. 1948. (Processed).

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that have use as plastics 20/ and in waterproofing cloth, and that can be converted into rubber-like materials.

20/ Filachione, E. M., Costello, E. J., Dietz, T. J., and Fisher, C. H. Lactic acid derivatives as plasticizers: Esters of polymeric lactic acid. U. S. Dept. Agr., Agr. Res. Admin., Bur. Agr. and Indus. Chem. AIC-295, 11 pp., 1951.

Studies are under way to reduce cost of refining and thus make their use more feasible commercially. The use of lactic acid in lacquers and protective coatings also is being developed.

P. V. Cardon,
Administrator, Agricultural Research Administration,
U. S. Department of Agriculture

APPAREL

SUIT, FLYING, PNEUMATIC, ANTI-G, TYPE G-4A, MANUFACTURED BY THE KOPS BROTHERS, INCORPORATED, NEW YORK, NEW YORK, by E. E. Martin. U. S. Air Development Force. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 3p Mi $1.25, Ph $1.25. PB 104597

1. Suits, Flying - Pneumatic - Tests 2. Kops Bros. Inc., New York City, N. Y. 3. AAF TSEAA MR 689-4M.

DCRDB-689-4M.

CHEMICAL AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

HISTOCHEMICAL DETECTION OF FATAL ANTICHOLINESTERASE POISONING, by A. Dorothy Bergner and Stanley H. Durlacher. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. May 1951. 16p photos, tables Mi $1.75, Ph $2.50. PB 104544

To explore the possibilities of the Koelle-Friedenwald histochemical method for localizing cholinesterase activity as a reliable method for determining whether or not death was caused by cholinesterase inhibitors in cases of acute poisoning. CMLEM-52. CC MD RR 59.

LD50 OF COLCHICINE, DIISOPROPYL FLUOROPHOSPHATE, INTOCOSTRIN AND POTASSIUM CYANIDE FOR MICE AT 4°C AND 25°C, BY EUGENE STREICHER WITH THE TECHNICAL ASSISTANCE OF William P. McShane. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. Apr 1951. 10p tables Mi $1.25, Ph $1.25. PB 104428

1. Colchicine - Toxicity 2. Diisopropyl fluorophosphate - Toxicity 3. Intocostrin - Toxicity 4. Potassium cyanide - Toxicity 5. Mice - Poisoning 6. CC MD RR 53.

CMLEM-52. Publication control no. 5030-53. Project no. 4-08-02-05. Test Program no.: T18.

Detergents

DETERMINATION OF FREE CALCIUM OXIDE IN BLEACHING POWDER. INTERIM REPORT by M. F. Gilchrist. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Jun 1951. 7p tables Mi $1.25, Ph $1.25. PB 104427

1. Calcium oxide - Use in bleaching powder 2. Powders, Bleaching - Analysis 3. Bleaching agents - Analysis 4. CC CRL IR 21.

CRLIR 21. Project 4-04-06-004.

Agricultural Chemicals

EVALUATION OF MITICIDES AND MITICIDE-TESTING PROCEDURES, by Fred M. Snyder and Leigh E. Chadwick. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. May 1951. 95p graphs, tables Mi $4.25, Ph $12.50. PB 104541

The objectives of the field tests reported herein were: (a) to determine and evaluate the various meteorological and biological factors which influence the effectiveness of several outstanding, toxicologically "safe" miticides when impregnated in cloth; (b) to determine which of these several miticides is best able to resist washing and to survive various types of aging tests; (c) to develop new and to evaluate old methods used in field investigations of miticides; and (d) to determine how protection is afforded by miticides impregnated into cloth. CMLEM-52. CC MD RR 55.

PEST CONTROL IN GERMANY DURING THE PERIOD 1939-1945, by R. P. Tew. British Intelligence Objectives Sub-Committee. 1951. 122p diagrs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.75, PB 104309

1. Insecticides - Production - Germany 2. Acaricides - Production - Germany 3. Fungicides - Production - Germany 4. Rodenticides - Production - Germany 5. BIOS OR 32.

REPORT OF THE PEST INFESTATION RESEARCH BOARD, WITH THE REPORT OF THE DIRECTOR OF PEST INFESTATION RESEARCH FOR THE YEAR 1949. Gt. Brit. Dept. of Scientific and Industrial Research. Pest Infestation Research Board. 1951. 44p photos, graph, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104583

1. Pest control - Gt. Brit. 2. Insecticides - Evaluation - Gt. Brit. 3. Fumigants - Gt. Brit. 4. DDT - Insecticides.

Sir John Simonsen, Chairman. S. O. Code 47-153-0-49.

SOME ASPECTS OF RESPIRATORY METABOLISM DURING METAMORPHOSIS OF NORMAL AND DDT-RESISTANT HOUSEFLIES, MUSCA DOMESTICA L, by Bertram Sacktor. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. May 1951. 22p graphs, tables Mi $2.00, Ph $3.75. PB 104542

In this study, the respiratory metabolism of two strains of house-fly has been investigated in order to ascertain some of the biochemical events associated with developmental processes, and to contribute to our scant knowledge of the mechanism of insect resistance to insecticides. CMLEM-52. CC MD RR 57.

TOXIC CHEMICALS IN AGRICULTURE. Gt. Brit. Ministry of Agriculture and Fisheries. Working Party on Precautionary Measures Against Toxic Chemicals Used in Agriculture. 1951. 17p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.30. PB 104396

1. Agricultural chemistry - Gt. Brit. 2. Chemicals, Toxic - Gt. Brit.

S. Zuckerman, Chairman. S. O. Code no. 24-190.

Plastics and Plasticizers

AIRCRAFT PROCESS SPECIFICATION FOR THE HEAT TREATMENT OF "PERSPEX" PANELS AND SHAPINGS. Gt. Brit. Ministry of Supply. Feb 1951. 2p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.15. PB 104590

1. Aircraft - Materials - Specifications - Gt. Brit. 2. Plexiglas - Heat treatment - Gt. Brit. 3. MS DTD 925A.
Supersedes D.T.D. 925.

ANNEALING OF STRUCTURES FORMED FROM UNPLASTICISED PERSPEX, by E. W. Russell. Gt. Brit. Royal Aircraft Establishment, Franborough, Eng. Sep 1949. 7p graphs, tables Mi $1.25, Ph $1.25. PB 104453

Stress relaxation experiments were conducted at constant deformations on unplasticized perspex material. Sheets of the material 3/16 in. thick were cut into strips 10 in. long and 1 in. wide. All the strips were heat treated at 140°C and annealed at 95°C. Stress relaxation measurements were made on the strips set up as bent beams under three-point loading to a constant deflection. Experiments were performed over the temperature range 75° to 95°C in 5° increments. Results, which are given in graphic form, indicate that the relaxation of stress in unplasticized polymethyl methacrylate at annealing temperatures and at constant deformations is similar to that of the plasticized material. Temperature 17° to 20°C higher are necessary to achieve comparable reductions in the general stress level. On the basis of relaxation data, conditions are proposed for the annealing of complete structures. Technical note no: Chem. 1104. See also PB 101906 (Tech. note Chem. 1094).

APPLICATION OF EXPLOSION BULGE TEST TO THE STUDY OF THE PLASTIC DEFORMATION OF WELDMENTS, by C. E. Hartbower and W. S. Pellini. U. S. Naval Research Laboratory. Jan 1951. 33p photos, diagrs, graphs Available from Office Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $1.00. PB 103772

A method has been developed for semi-works-scale testing of full welds in heavy plate under combined stress conditions such as prevail in structures. The test features the bulging of welded plate in diaphragm fashion. Uniform loading of the test plate is accomplished by means of an air blast set up by the detonation of an explosive. By modification of bulge geometry it is possible to obtain a wide range of stress fields. Photogrid deformation studies of prime and butt-welded plates, 3/4 inch thick, have been made on both spherical and ellipsoidal bulges in order to provide conditions of balanced (1:1), and unbalanced (0.8:1) stress fields. The test weldments consisted of a firebox-grade steel joined by means of single-pass submerged-arc welds and also by manual double-V butt welds. The welds investigated provided conditions of closely matching, and of overmatching, weld-metal and parent-plate flow strengths. It has been demonstrated that the stress and strain states imposed by the loading conditions are not accepted as such by the weld joint. Depending on the overmatching characteristics of the weld and its geometry, a system of stress and strain entirely foreign to the remainder of the structure may be developed in the weld and near-weld regions. The significance of these findings is discussed in terms of weld performance evaluation. NRL R 3790.

BENDING OF METAL FOILS TO PLASTICS FOR USE IN PRINTED CIRCUITS, by H. G. Manfield and J. M. Robertson. Gt. Brit. Ministry of Supply. Telecommunications Research Establishment, Gt. Malvern, Worcs, Eng. Jun 1949. 14p photos, graphs Mi $1.75, Ph $2.50. PB 104455

One of the best methods of printing a circuit is the "Pressed and Etched Foil" system, in which a piece of copper foil is bonded to a plastic insulating material. The chosen circuit is printed on the copper with acid resisting ink and the uninked portion is etched away with suitable acid, by electrolysis or in a deplating bath. Several methods of bonding the copper foil to the plastic base are discussed. The best results were obtained by the use of phenolformaldehyde cement applied thinly and evenly. Treatment of the under surface of the copper is essential. Light acid etching is probably the simplest method of treating the surface. T.R.E. Technical note no. 36.

EFFECT OF FUEL IMMERSION ON LAMINATED PLASTICS, by W. A. Crouse, Margie Carickhoff and Margaret A. Fisher. U. S. National Advisory Committee for Aeronautics. Jun 1951. 32p photos, diagrs, tables Mi $2.25, Ph $5.00. PB 104248

Effects of cylic and continuous immersion in heptane, toluene, and SR-6, a test fuel, on the weight, dimensions, and flexural properties of 19 samples of laminated plastics were determined. No one sample exhibited smaller changes than all other samples for all fuels and for both cyclic and continuous immersion. The best weight and dimensional stability in the cyclic test was shown by a glass-fabric unsaturated-polyester laminate. The changes in flexural strength as well as in flexural modulus of elasticity were losses in the majority of cases after both the cyclic and continuous immersion tests. NACA TN 2377.

IMPACT TESTING OF PLASTICS: ELIMINATION OF TOSS FACTOR, by B. Maxwell and L. F. Rahm. Princeton University. Plastics Laboratory. Dec 1948. 16p diagrs, graph Mi $1.75, Ph $2.50. PB 104522

Presented here is a new method of measuring the impact strength of polymeric materials which eliminates the extraneous energies measured by the standard Izod test, the most important of which is the energy to toss the broken half of the sample. The apparatus is described and the data for several materials both by the new method and the standard Izod method are tabulated. Comparison of results show that this new method ranks materials in the proper order as indicated by service performance of the materials. Experiments are described which lead to the conclusion that the impact strength as determined by this new method is independant of the mass of the broken sample. This permits testing over a wide range of velocities to which this method is easily adapted. PU PL TR 12C.

INVESTIGATION OF THE STRUCTURE OF PHENOLIC RESINS, PT. I-III, by S. R. Finn and G. J. Lewis. Gt. Brit. Chemical Defense Experimental Station, Parton, Wilts. Aug 1949. 25p diagr Mi $2.00, Ph $3.75. PB 104454

The structure of phenolic resins was investigated. Evidence is presented in support of the theory that the structure of compound m.p 215°, isolated from a p-cresol-formaldehyde resin made under acidic conditions, is that of a linear molecule of three benzene rings linked by two methylene bridges. A new three-ring compound, containing two chloride atoms

in place of two methyl groups, is also described. The structure of the mono-alcohol of 3:5 dimethylphenol has been confirmed. The synthesis of a dialcohol, which has been characterized as an ortho-ortho compound, is described. The effect of reaction conditions on the position of methylol substitution is discussed. Experiments are described which confirm the tri-nuclear structure of 2:2' dihydroxy 4:5:4':5' tetramethyl diphenyl methane. A method of determining molecular weights cryoscopically in phenol is described. Porton Technical papers no. 118, 119, 120. Contents: Pt. I. Trinuclear compound from p-cresol, by S. R. Finn and G. J. Lewis. - Pt. II, by S. R. Finn and G. J. Lewis. - Pt. II. Methylol compounds of 3:5 dimethylphenol. - Pt. III (a) Diphenyl methanes of 3:4 dimethyl phenol; (b) Determination of molecular weight.

NATIONAL DEFENSE CONTRACTUAL MATERIALS AND PROCESSES FOR LOW TEMPERATURE RF CABLE JACKETS. FINAL DEVELOPMENTAL REPORT, CONTRACT W36-039-SC-33639 (INCLUDING REPORT FOR QUARTER ENDING APR 15, 1950) PREPARED by F. A. Muller and S. Kaganoff. Federal Telecommunication Laboratories, Inc., Nutley, N. J. Jun 1950. 142p tables (part fold) Mi $5.75, Ph $18.75. PB 104426

1. IN-III (Plastic) 2. Cables, Coaxial - Sheaths 3. Plastics, Polyvinyl chloride 4. Coatings, Plastic 5. SIG Contract W36-039-sc-33639, Final report. Dept. of the Army project: 3-26-00-600. Signal Corps project: 2006.

POLYMETHYL METHACRYLATE (PERSPEX TYPE) PLASTICS; CRAZING, THERMAL AND MECHANICAL PROPERTIES, by H. Warburton Hall and E. W. Russell. Gt. Brit. Royal Aircraft Establishment, Farnborough, England. Oct 1949. 142p photos, graphs, tables Mi $5.75, Ph $18.75. PB 104158

The more practical aspects of the results of a long-term investigation of the basic physical and chemical properties of polymethyl methacrylate (perspex type) plastic are summarized. Thermal, elastic, crazing, solvent absorption and mechanical properties are included and the effect of these on the service efficiency of a plastic structure is described. Experimental proof is given concerning the essential role of tensile stress and absorbed solvent in causing crazing, and recommendations concerning means to reduce or avoid the incidence of crazing are included. The basic thermal properties are compared with those of metals, and the dangers of differential expansion in combined metal-plastic structures are noted together with the serious effects of chilling of plastic structures during the "hot-forming" operation. Details are given of appropriate heat treatments designed to remove casting and workshop strains without causing distortion. Class no. 679.547: 547:391.3. Report no. Chemistry 454. R.A.E. Ref: Chem. 490/HWH/EWR/55. M.O.S. Ref: 7 Plastics/RD Mat.NM.2.

REPORT ON EVALUATION OF CLEANERS FOR ACRYLIC PLASTICS, by Charles A. Cassola. U. S. Naval Air Material Center. Aeronautical Materials Laboratory, Philadelphia, Pa. Dec 1949. 52p photos, diagrs, tables Mi $2.75, Ph $7.50. PB 104343

An investigation was made to evaluate the comparative craze-inducing properties and the performance characteristics of seven cleaners for acrylic plastics. Four cleaners were commercial types, the other cleaners were kerosene, Stoddard solvent, and aliphatic naphtha. The stability, freezing, chemical attack, residue and marring, and cleanability characteristics of the cleaners were investigated. It was found that cleaner "Z" induced the least amount of crazing, followed by aliphatic naphtha, cleaner "X", Stoddard solvent, kerosene, cleaner "Y", and cleaner "W". With the exception of cleaner "W", which crazed below the desired 2000 psi min for stressed acrylic surfaces, the cleaners were considered satisfactory. Contents: - Appendix I. Performance test methods and requirements for cleaning compounds for acrylic plastics. NAM AML 440016, part II.

REPORTS ON SYNTHETIC RESINS. Steinkohlen Bergwerk Rheinpressen G.m.b.H., Homberg, Ger. 1941-1942. 47f diagrs, tables (Text in German) Mi $2.50, Enl Pr $7.50. PB 101062

1. Resins, Synthetic - Production - Germany 2. Micro BIOS FD 27/48, Frames 1-44.

English abstract included. Abstract available as PB 101062s. 2p. Mi $1.25, Ph $1.25.

SYMPOSIUM ON THE PLASTIC DEFORMATION OF CRYSTALLINE SOLIDS, MELLON INSTITUTE, PITTSBURGH, 19, 20 MAY 1950, UNDER THE JOINT SPONSORSHIP OF THE CARNEGIE INSTITUTE OF TECHNOLOGY AND THE DEPT. OF THE NAVY, OFFICE OF NAVAL RESEARCH. U. S. Office of Naval Research. May 1950. 226p photo, diagrs, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $3.50. PB 104604

1. Plastic deformation - Solids 2. Plastic deformation - Theory 3. Crystals - Lattices - Distortion 4. Alkali metal halides - Plastic deformation 5. Crystals, Copper - Plastic deformation 6. Crystals, Lead - Plastic deformation 7. Crystals, Zinc - Creep 8. Metals - Structure 9. Metals - X-ray tests 10. Metals - Yield point 11. Young's modulus 12. Mellon Institute of Industrial Research, Pittsburgh, Pa. 13. Carnegie Institute of Technology.

Contents: Foreword, by J. S. Koehler. - Theory of plastic flow in single crystals, by Frederick Seitz. - Influence of plastic flow on the electrical and photographic properties of the alkali halide crystals, by Frederick Seitz. - Multiplication processes for slow-moving dislocations, by F. C. Frank and W. T. Read, Jr. - Creep of zinc crystals, by E.P.T. Tyndall. - Yield point in single crystal and polycrystalline metals, by A. H. Cottrell. - Lamellar nature of slip and its implications, by T. H. Blewitt and J. S. Koehler. - Origin of dislocations, by F. G. Frank. - Experimental and theoretical results of plasticity at normal speeds of strain, by U. Dehlinger - X-ray diffraction studies of cold work in metals, by B. E. Warren and B. L. Averbach. - Dislocation models of crystal grain boundaries, by W. T. Read and W. Shockley. - Resultant content of dislocations in an arbitrary intercrystalline boundary, by F. C. Frank. - Study of amplitude-dependent internal friction arising from the motion of dislocations in single crystals of copper, by A. S. Nowick. Decrement and Young's modulus measurements on single crystals of copper and lead, by J. Marx and J. S. Koehler. - Structures of cold-worked metals as deduced from amelastic measurements, by T. S. Ke and C. Zener. - Plasticity of polycrystalline solids, by Bruce Chalmers. - Wanted: experimental support for

theories of plastic flow, by J. C. Fisher and J. H. Hollomon. - Theory of deformation textures in face-centered cubic metals, by Walter R. Hibbard, Jr. - Crystallographic aspect of slip in body-centered cubic single crystals, by A. Opinsky and R. Smoluchowski.

TWIN-WORM PLASTICIZING MACHINE FOR IGELIT. I. G. Farbenindustrie A. G., Schkopau, Ger. Aug 1944. 3f (Text in German) Mi $1.25, Enl Pr $1.50. PB 104178

1. Plastics - Plasticizing machinery - Germany 2. Machines, Plasticizing - Germany 3. Igelit (Trade name) 4. KUTEKO (Kunstoff-Technische Kommission) 5. IMP (Plasticizing machine) 6. Micro BIOS FD 2361/47, Frames 1-2.

English abstract included. Abstract available as PB 104178s. 1p. Mi $1.25, Ph $1.25. Letters to KUTEKO, Aug 4 and 12, 1944.

VINYL CHLORIDE AND SOFTENED VINYL CHLORIDE POLYMERISATION PRODUCTS. I. G. Farbenindustrie A. G., Schkopau, Ger. 1943-1944. 62f drawings (Text in German) Mi $3.00, Enl Pr $10.00. PB 104120

1. Vinyl chloride - Tests - Germany 2. Polyvinyl chloride - Tests - Germany 3. Plastics - Tests - Germany 4. Micro BIOS FD 1155/49, Frames 1-60.

English abstract included. Abstract available as PB 104120s. 2p. Mi $1.25, Ph $1.25. Includes reprint from Kunstoffe Dec 1943 of article by P. Nowak entitled Standardization of plastics, rules for testing plastics by VDch.

Paints, Varnishes and Lacquers

EFFECT OF AGING ON PENACOLITE CEMENTED ACRYLIC-NYLON JOINTS, APPLICABLE TO F-86A AIRPLANES (N.A.A. MODEL NA-161), PREPARED by R. H. Wight and G. W. Walker. North American Aviation, Inc. Engineering Research Laboratory, Los Angeles, Calif. Feb 1950. 4p drawing, table Mi $1.25, Ph $1.25. PB 104560

The effect of room-condition aging, up to 10 weeks, on acrylic-nylon joints bonded with Penacolite XG-1500-2 was investigated. Thirty sheets of acrylic plastic sheet and 30 strips of nylon fabric were prepared for testing. The nylon was cemented to the acrylic with the subject Penacolite in the form of a loop. Pressure was applied to the specimens through spring-clamp-loaded sponge-rubber blocks. The cemented specimens were then placed in a constant temperature and humidity chamber and allowed to cure for five days. After curing, the specimens were aged for 48 hr, and one, two, five, and ten weeks, and joint strengths were determined at the end of each aging period. No significant difference was found to exist among the strengths of the joints aged for periods up to 10 weeks. The average single joint strengths varied only between 474 and 493 psi. Report no. NA 50-238. Contract W33-038-ac-21671.

HIGH TEMPERATURE RESISTANT INSULATING VARNISH. QUARTERLY REPORT NO. 2 ON CONTRACT NO. W-36-039-sc-36866, OCT 1948-JAN 1949, by Dr. B. H. Kress and E. Armstrong. Vita-Var Corporation, Newark, N. J. Jan 1949. 54p tables Mi $2.75, Ph $7.50. PB 104128

1. Varnishes, High temperature resistant 2. Insulating varnishes 3. SIG Contract W36-039-sc-36866 Report no. 2.

INSPECTION KIT FOR FINISHES, by Aubrey J. Raffalovich. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Jun 1951. 12p photo Mi $1.75, Ph $2.50. PB 104598

1. Coatings - Testing equipment. 2. SCEL TM M-1379.

Dept. of the Army project: 3-93-00-503. Signal Corps project: 2005-33.

LUMINESCENT PIGMENTS. FINAL REPORT ON CONTRACT NO. W-36-039-SC-32256, PERIOD JUNE 14, 1946-JUNE 14, 1948. DuPont de Nemours, E. I., Co., Inc. Pigments Dept., Newport, Del. Jun 1948. 26p tables Mi $2.00, Ph $3.75. PB 104067

1. Phosphorescent materials - Production 2. Paints, Luminescent 3. SIG Contract W36-039-sc-32256, Final report.

STRENGTH OF ALUMINUM LAP JOINTS AT ELEVATED TEMPERATURES (TEXTS CONDUCTED IMMEDIATELY AFTER THE TEMPERATURE WAS REACHED), by Edward W. Kuenzi. U. S. Forest Products Laboratory, Madison, Wis. Dec 1949. 35p graphs, tables Mi $2.25, Ph $5.00. Limited supply available free from U. S. Forest Products Laboratory, Madison, Wis. PB 104450

Tests were made to determine the strength at elevated temperatures of lap-joint specimens of clad 24S-T3 aluminum alloy bonded with nine different adhesives. Six adhesives were cured under three different conditions, and three were cured under only one condition. Six panels were made with each adhesive and for each curing condition, each specimen being tested at one of the following temperatures: 75, 150, 250, 450, and 600°F. Upon reaching the test temperature, load was applied at a rate of 600 lb per min until failure occurred. The results show that the highest strengths at elevated temperatures were obtained with a high-temperature-setting phenol resin -- synthetic-rubber adhesive. The highest strengths at room temperature were obtained with a high-temperature-setting modified phenol polyvinyl butyral adhesive. Prepared under Bureau of Aeronautics Order no. NBA-PO-NAer 00619 Amendment no. 2, and U. S. Air Force no. USAF-PO-(33-038)48-41-E.

Miscellaneous Chemicals

AROMATIZATION TO TOLUENE OF THE C_7-FRACTION OF A. K. GASOLINE WITH ALKALIZED CHROMIUM OXIDE ALUMINUM OXIDE-CATALYSTS (ENDURANCE TESTS), by Dr. Martin, Dr. Hargemann, Director von Asboth, Dr. Kolling. Ruhrchemie A. G., Oberhausen-Holten, Ger. Oct 1943. 4p Mi $1.25, Ph $1.25. PB 103781

1. Catalysts, Aromatization - Germany 2. Catalysts, Chromium oxide - Aluminum oxide - Germany 3. Toluene - Production - Germany 4. Sinclair Refining Co. Research and Development Dept. 5. Micro TOM 298, Frames 8403-8406, translation.

Translated by M. W. Beth, Sinclair Refining Co., Research and Development Dept. Translation book 1950-068.

CATALYSTS IN THE OPERATION OF ATMOSPHERIC PRESSURE SYNTHESIS. Ruhrchemie A. G., Oberhausen-Holten, Ger. 1935-1942. 209f graphs, tables (Text in German) Mi $7.50, Enl Pr $27.50. PB 104170

1. Catalysts - Germany 2. Catalysts, Cobalt-thorium - Germany 3. Catalysts - Reactivation - Germany 4. Gas - Synthesis - Germany 5. Micro BIOS FD 5615/47, Frames 1-203.

Abstract available as PB 104170s. 2p. Mi $1.25, Ph $1.25.

EFFECT OF ADDITIVES TO THE AMMONIA CATALYST ON THE NUMBER AND ENERGY OF ACTIVE CENTERS, by Dr. Peters. I. G. Farbenindustrie A. G., Oppau, Ger. Feb 1944. 26p fold. graphs, tables Mi $2.00, Ph $3.75. PB 103782

1. Ammonia - Catalysts - Effect of additives - Germany 2. Sinclair Refining Co. Research and Development Dept. 3. Micro TOM 300, Frames 7267-7302, translation.

Ammonia Laboratory report no. 1728. Translated by M. Beth, Sinclair Refining Co., Research and Development Dept., Dec 19, 1950. Translation book 1950-166.

EFFECTS OF ADDITIVES TO THE AMMONIA CATALYST: STABILIZERS AGAINST THERMAL SINTERING AND POISON ACCEPTORS, by Peters. I. G. Farbenindustrie A. G., Oppau, Ger. Feb 1944. 28p graphs Mi $2.00, Ph $3.75. PB 103778

1. Ammonia - Catalysts - Effect of additives - Germany 2. Stabilizing agents - Germany 3. Sinclair Refining Co. Research and Development Dept. 4. Micro TOM 297, Frames 7235-7266, translation.

Translated by M. Beth, Sinclair Refining Co., Research and Development Dept., Jan 9, 1951. Translation book 1951-1.

EXPERIMENTS WITH IRON CATALYSTS EMPLOYED IN THE MEDIUM PRESSURE PARAFFIN WAX SYNTHESIS. Ruhrchemie A. G., Oberhausen-Holten, Ger. 1939-1944. 278f photos, drawings, graphs, tables (Text in German) Mi $9.00, Enl Pr $37.50. PB 103877

1. Catalysts, Iron - Germany 2. Paraffin wax - Synthesis - Germany 3. Micro TOM 225 4. Micro BIOS FD 3661/47, Frames 1-373.

Abstract available as PB 103877s. 2p. Mi $1.25, Ph $1.25.

PREPARATION OF CHLOROPHYLL DERIVATIVES FOR INDUSTRIAL AND PHARMACEUTICAL USE, by Monroe E. Wall. U. S. Bureau of Agricultural and Industrial Chemistry. Mar 1951. 7p Available free from Bureau of Agricultural and Industrial Chemistry, U. S. Dept. of Agriculture, Washington 25, D. C. PB 103970

1. Chlorophyll - Preparation 2. Chlorophyll - Derivatives - Preparation 3. Sodium copper chlorophyllin. 4. AIC-299.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 30) INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-ac-15228 (16258) PREPARED by B. D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Aug 1949. 23f diagr, graphs, tables Mi $2.00, Enl Pr $5.00. PB 104464

1. Radar - Domes - Materials 2. Foams, Chemical - Electrical properties 3. Coatings, Protective.

GER 451 appx. 30. See also PB 104463, 104465-104471. Ref R-09-03 pt. 32.

REPORT ON THE PREPARATION OF THE TOKA-CATALYST IN THE PILOT PLANT UNIT, by Herr Spiske. Jan 1944. 3p Mi $1.25, Ph $1.25. PB 103780

1. Catalysts, Alumina - Germany 2. Catalysts - Preparation - Germany 3. Sinclair Refining Co. Research and Development Dept. 4. Micro TOM 398, Frames 8400-8402A, translation.

Translated by M. Beth, Sinclair Refining Co., Research and Development Dept., Dec 19, 1950. Translation book 1950-167.

STUDIES ON THE DIFFERENTIAL ACTIVITIES OF AL_2O_3 SAMPLES USED AS SUPPORTS OF AROMATIZATION CATALYSTS, by Herr Spiske. Feb 1940. 4p tables Mi $1.25, Ph $1.25. PB 103777

1. Aluminum oxide - Production - Germany 2. Catalysts, Alumina - Germany 3. Catalysts, Oxidation - Germany 4. Sinclair Refining Co. Research and Development Dept. 5. Micro TOM 291, Frames 2900-2907, translation.

Translated by M. Beth, Sinclair Refining Co., Research and Development Dept., Nov 16, 1950. Translation book 1950-147.

ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

Electronics

ABAOS FOR NOISE CALCULATION IN NUCLEAR PHYSICS AMPLIFIERS, by N. F. Moody and M. O. Deighton. National Research Council of Canada. Atomic Energy Project. Mar 1950. 11p graphs Available from National Research Council of Canada, Ottawa, Canada $.15. PB 104656

1. Amplifiers - Noise - Measurements - Canada 2. Nuclear physics - Research - Canada 3. Atomic power - Research - Canada 4. Mathematical formulas and equations - Canada 5. NRCC AEP CREL-444 6. NRCC 2388.

ANALYTICAL INVESTIGATION OF FULLY DEVELOPED LAMINAR FLOW IN TUBES WITH HEAT TRANSFER WITH FLUID PROPERTIES VARIABLE ALONG THE RADIUS, by Robert G. Deissler. U. S. National Advisory Committee for Aeronautics. Jul 1951. 28p graphs Mi $2.00, Ph $3.75. PB 104371

Relations were analytically obtained for the prediction of radial distributions of velocity and temperature for fully developed laminar flow of gases and of liquid metals in tubes with fluid properties variable along the radius. By use of the relations for velocity and temperature distributions, relations were obtained among Nusselt number, friction parameter, and ratio of wall to bulk temperature. NACA TN 2410.

BEAM WIDTH AND PULSE LENGTH IN RADAR WEATHER DETECTION. Massachusetts Institute of Technology. Dept. of Meteorology. Aug 1950. 65p photos, diagrs, table Mi $3.00, Ph $8.75. PB 104285

The resolution of a radar system is limited by several factors, perhaps the most important being the angular width of the beam and the length of its pulse. These two factors cause distortions in the presentation of weather echoes on scopes and errors in the measurement of signal strength unless proper

corrections can be applied. In Part A of this report, Arthur E. Bent discusses the distortions in presentation and points out the difficulties one finds in attempting to correct for these distortions. Part B develops a means of correcting radar signal strength measurements in those cases where the beam may be only partially filled with precipitation. The nomogram was prepared by Melvin L. Stone. The general discussion and application of the nomogram were contributed by Dr. Pauline M. Austin. Weather radar research. Technical report no. 12 under Contract W36-039-sc-32038. Dept. of the Army project: 3-99-05-022. Signal Corps project: 122 B-C. Contents: Part A. Distortions in the presentation of weather echoes caused by beam width and pulse length, by Arthur E. Bent. - Part B. A means of correcting radar measurements in the case of partially filled beams, by Pauline M. Austin and Melvin Stone.

ELECTRICAL BREAKDOWN IN A SLOT ANTENNA, by Arthur E. Hansen. May 1949. 34p photos, diagrs, graphs Mi $2.25, Ph $5.00. PB 103666

The problem of controlling discharge phenomena resulting from a high-frequency electric field being impressed across a slot which is cut in a conducting surface was investigated. The breakdown mechanism is postulated, and the theory of a high-frequency electrical discharge in a gas is developed. Equations of motion for an electron under the force of a high-frequency electric field are derived and the ionization energy of air is computed. A detailed description is given of the experimental instrumentation developed to determine operating conditions at which initiation of the arc is least likely to occur for a given frequency, slot width, and pressure. Thesis-Rensselaer Polytechnic Institute, Troy, N. Y.

FIVE RADOMES AND DATA. INTERIM ENGINEERING REPORT ON RESEARCH AND DEVELOPMENT UNDER CONTRACT NO. W33-038-AC-21307(20345), MAY 1-MAY 31, 1949. Stupakoff Ceramic & Mfg. Co., Latrobe, Pa. Jun 1949. 28p tables Mi $2.00, Ph $3.75. PB 104553

An interim engineering report concerns the development of ceramic or other dielectric materials suitable for missile radomes. Dielectric constant and loss tangent measurements have shown that zircon porcelains, chemical porcelain and spark plug porcelain are at, or near, the upper specification limit for solid wall material. Modulus of rupture and impact strength data appear to be influenced by size and shape of test specimens. Compressive strength does not appear to be influenced by the size or shape within the limits tested. Transmission panels 18 x 36 in. cannot be fired satisfactorily in a horizontal position. Exceptionally low dielectric constants were found in solid wall materials ; however, the physical strength of these materials is low and must be increased. Report no. U-12224-8. Pages numbered 164-190.

IMPEDANCE MATCHING OF ANTENNAS, by Albert Nadel. North American Aviation, Inc. Aerophysics Laboratory, Los Angeles, Calif. May 1947. 14p diagrs, graphs Mi $1.75, Ph $2.50. PB 103659

In the design of antenna systems for telemetering receivers and transmitters operating at a frequency of 500 mc, the problem of impedance matching was an important consideration. This report summarizes several impedance matching techniques, and presents a survey of available literature for practical antenna impedance design data. The appendices include a mathematical treatment of impedance matching, and a derivation of the formulas for the inner or outer diameters of the $\lambda/4$ impedance -matching sleeves. Aerophysics Laboratory report no AL-204.

LABORATORY AND FLIGHT EVALUATION OF AN/ARR21 (XN-1) RADIO RECEIVING EQUIPMENT, BY J. M. STAINBACK. FINAL REPORT ON PROJECT NO. TED NO. PTR EL 926. U. S. Naval Air Test Center. Electronics Test Division, Patuxent River, Md. Jun 1949. 51f photos, diagr, graphs Mi $2.75, Enl Pr $8.75. PB 104212

The AN/ARR-21(XN-1) radio receiver is a miniature navigational type designed for aural reception of low-frequency range signals, with voice and MCW signals received in the 190 to 550 kilocycle frequency range. Laboratory and flight evaluation of the unit showed a susceptibility of the receiver to a very low frequency ripple from the d-c power supply. The performance of the AN/ARR-21 under simulated service conditions was exceptionally good, with the limiting exception of vibration tests. As a result of vibration, the resonant frequency drift exceeded the specified limit of 2 kc. The voice quality can be determined under most conditions. The dial calibration is good and the lack of any appreciable back-lash is highly desirable. Report ET 331-83. NATC ET-331-83.

LINEAR AMPLIFIER TYPE AEP 1444, by N. F. Moody and W. D. Howell. National Research Council of Canada. Atomic Energy Project. Apr 1950. 24p photo, diagrs, graphs, tables Available from National Research Council of Canada, Ottawa, Canada. $.20. PB 104657

1. Amplifiers, Linear - Canada 2. AEP 1444 (Amplifier) 3. Atomic power - Research - Canada 4. NRCC AEP IM-8 5. NRCC 2400.

METALLIZED PAPER CAPACITORS. FINAL ENGINEERING REPORT (8TH QUARTERLY REPORT) UNDER CONTRACT W36-039-SC-36860. Sprague Electric Co., North Adams, Mass. Apr 1950. 31p graphs, tables Mi $2.25, Ph $5.00. PB 104114

1. Capacitors, Paper dielectric - Metallized 2. Paper, Metallized 3. SIG Contract W36-039-sc-36860, Final report.

Dept. of the Army project: 3-26-00-600. Signal Corps project: 2006.

ON THE DEVELOPMENT OF A SET OF HIGH POWER CW MAGNETRONS TUNABLE FROM 5000 TC 11000 MEGACYCLES, by W. C. Darrah. Raytheon Manufacturing Co., Waltham, Mass. Aug 1949. 38f graphs table Mi $2.25, Enl Pr $6.25. PB 104213

The final engineering report on a set of high power CW magnetrons to be tunable from 5000 to 11000 megacycles summarizes sequence of development, problems encountered, and the results obtained. Because of extraneous resonance, the present QK168 and QK167 tubes require a complete revision of the anode, cathode, and interaction space design. Also, the QK165 and QK166 models can not be scaled to higher frequencies (QK167 and QK168 range) because of their small geometries and power limitations. Therefore, a study of scalable prototypes was initiated, and a set of tuner design equations were worked

out which made the satisfactory design of a new tuner for any magnetron feasible. It was recommended that the solution to the original problem be approached by a continuation of the scalable prototype development method. Final engineering report FER QK 165-168.

ON TWO-DIMENSIONAL FLOW AFTER A CURVED STATIONARY SHOCK (WITH SPECIAL REFERENCE TO THE PROBLEM OF DETACHED SHOCK WAVES), by S. S. Shu. U. S. National Advisory Committee for Aeronautics. May 1951. 19p Mi $1.25, Ph $2.50. PB 103737

The problem of two-dimensional flow behind a curved stationary shock wave is considered analytically. The method assumes a given shock-wave shape, which automatically determines certain initial conditions on the flow variables; and the flow pattern, including any body shape, follows from the initial conditions. Approximate analytic expressions are found for the stream function in the subsonic region following the shock and, after the stream function is obtained, the flow density is determined by Bernoulli's equation which connects the density with the derivatives of the stream function. The final solution can then be determined from the velocity field thus obtained. NACA TN 2364.

OPERATING AND TECHNICAL MANUAL, E.H.T. UNIT AEP 1007A, by Electronics Branch. National Research Council of Canada. Atomic Energy Project. Mar 1950. 18p photo, diagrs Available from National Research Council of Canada, Ottawa, Canada. $.15. PB 104660

1. AEP 1007A (High tension set) 2. Electronic equipment - Power units - Canada 3. Generators, High voltage - Canada 4. Atomic power - Research - Canada 5. NRCC AEP IM-7 6. NRCC 2399.

REPRESENTATION, MEASUREMENT, AND CALCULATION OF EQUIVALENT CIRCUITS FOR WAVEGUIDE DISCONTINUITIES WITH APPLICATION TO RECTANGULAR SLOTS, by Nathan Marcuvitz. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. 1949. 247f photos, diagrs, graphs, tables Mi $9.00, Enl Pr $32.50. PB 104205

A summary is given of work on the calculation and measurement of the equivalent circuit parameters of microwave structure rectangular slots that are employed as coupling elements in various microwave structures. Schematic network representation of the waveguide regions in terms of conventional transmission lines and of the discountinuity regions in terms of lumped constant equivalent circuits is explained. Experimental and theoretical methods of determining equivalent circuit parameters and results obtained with several types of slot coupling are discussed. Experimental measurements technique is outlined, and experimental values of the equivalent circuit parameters of rectangular slots in waveguide are presented. Some methods of summation of slowly convergent infinite series are included. Report no. R-193-49-PIB-137. Contract no. W-28-099-ac-146. PIB 137.

SINGLE-OPERATOR SIGNAL TRACKING ON GROUND RADAR, by Adelbert Ford, M. W. Olson, David Rigler, G. E. Dugan and M. H. Getz. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1950. 101p diagrs, graphs, tables Mi $4.50, Ph $13.75. PB 104367

A series of scope discrimination studies, by the measurement of human error and reaction time, was made to evaluate scale-reading and cursor-tracking techniques on sector-type radar scopes used in ground installations. Particularly it was desirable to discover error tendencies when a single operator was assigned a multiple task of reporting as many as three space variables: range, azimuth, and elevation. It was found that even the simplest types of superimposed area-scales lead to several families of systematic errors, and more than five times the spread of random errors as compared with cursor-tracking methods. This is true when a specially designed cursor plate is used in conjunction with a manual control which can be moved with at least two degrees of freedom. Lehigh University Contract W33-039-sc-22561. This work originally had its inception in the scale-reading studies done under Contract no. W28-099-ac-130, 1 July 1946 to 30 June 1948. On 1 October 1948, the cursor-tracking experiments were initiated under Contract W33-038-ac-22561. Though the work of the two contracts was done at different times it is apparant that the results are complementary. AAF TR 6370.

STROBOSCOPIC X-RAY DIFFRACTION EXAMINATION OF OSCILLATING PIEZO-ELECTRIC CRYSTALS. FIRST ANNUAL REPORT TO THE U. S. ARMY SIGNAL CORPS UNDER CONTRACT NO. W-36-039-SC-32031, PROJECT 2001-9, by R. Pepinsky. Auburn Research Foundation, Auburn, Ala. Apr 1947. 183p photos, drawings, diagrs, tables Mi $6.75, Ph $23.75. PB 104261

The following aspects of this work are reviewed briefly herein: 1. Aims and advantages of stroboscopic examination. 2. General experimental procedure. 3. X-ray tube construction and operation. 4. Procedures for primary beam stabilization. 5. Peak-sensitive tube current and X-ray pulse measurements. 6. Film photometering and direct average intensity measurements. 7. Crystal driving circuit. 8. Synchronizing, phasing, and oscilloscope sweep circuits. 9. Selection and mounting of crystals. 10. X-ray diffraction procedure. A number of appendices have been added to permit segregation from the main body of the report of material germane to the text but so speciallized as otherwise to interrupt the continuity of the discussion. For other reports on this contract see PB 104262-104265. SIG Contract W36-039-sc-32031, Report no. 1.

STROBOSCOPIC X-RAY DIFFRACTION EXAMINATION OF OSCILLATING PIEZO-ELECTRIC CRYSTALS. SECOND ANNUAL REPORT TO THE U. S. ARMY SIGNAL CORPS UNDER CONTRACT NO. W-36-039-SC-32031, PROJECT 2001-9, by R. Pepinsky. Auburn Research Foundation, Auburn, Ala. Apr 1948. 105p photos, diagrs, graphs, tables Mi $4.50, Ph $13.75. PB 104262

Activities during this period have been concerned with the following matters: (1) a structural analysis of ammonium dihydrogen phosphate, and study of the influence of lattice distortions upon the structure; (2) methods of mounting the hard-driven oscillating crystal; (3) X-ray intensity measurements, by film photometers and Geiger counters; (4) construction and operation of the fine-focus, grid-controlled X-ray tubes; (5) a theoretical investigation of crystal vibrations. The most important advance during this year has been in the development of a comparison

method by which reflections from two different points in the oscillation cycle can be measured to a very high degree of precision. For other reports on this contract see PB 104261, 104263-104265. Includes notes on an inductively coupled high-voltage stabilizer, by Guenter Schwarz and Earl H. Byerly. SIG Contract W36-039-sc-32031, Report no. 2.

STROBOSCOPIC X-RAY DIFFRACTION EXAMINATION OF PIEZOELECTRICALLY OSCILLATING CRYSTALS. QUARTERLY PROGRESS REPORT TO THE U. S. ARMY SIGNAL CORPS, 5TH, MAR 1-JUNE 1, 1947, by R. Pepinsky. Auburn Research Foundation, Auburn, Ala. Jun 1947. 9p photos, table Mi $1.25, Ph $1.25. PB 104263

Work during this period has been concerned with the following matters: (1) Preparation of the First Annual Report, and a review of all novel devices for patent purposes. (2) Examination of the X-ray scattering characteristics of ammonium dihydrogen phosphate. (3) Completion of the oscillating crystal goniometer. (4) Correction of vacuum system difficulties for the pulsed X-ray tube. (5) Construction of Geiger tube mount, regulated voltage supply, scaling system and counter. (6) Consideration of efficiency-enhancement of the fluorescent-screen-plus-photomultiplier X-ray detector. For other reports on this contract see PB 104261-104262, 104264-104265. SIG Contract W36-039-sc-62031, Quarterly report no. 5.

STROBOSCOPIC X-RAY DIFFRACTION EXAMINATION OF PIEZOELECTRICALLY OSCILLATING CRYSTALS. QUARTERLY PROGRESS REPORT TO THE U. S. ARMY SIGNAL CORPS, 6TH, JUNE 1-SEP 1, 1947, by R. Pepinsky. Auburn Research Foundation, Auburn, Ala. Sep 1947. 62p diagrs Mi $3.00, Ph $8.75. PB 104264

Work during this period has been concerned with the following matters: A. Critical examination of X-ray intensity measurements by means of Geiger Mueller counters, and of associated electronic circuitry. (1) The availability of the grid-controlled X-ray tube has permitted measurements not heretofore possible in Geiger counter investigations. Specifically, (a) it has been possible directly to measure the dead and recovery times of X-ray counters under varieties of operating conditions, with counter and circuit voltage wave-forms completely observable throughout the measurements; (b) to observe the rapidity of response of a counter to an X-ray photon; (c) to improve the signal-to-noise ratio in the counting system by a factor of fifty or more. (2) A procedure for direct examination of the statistics of photon counting is described, and a study of the ultimate limits of accuracy of X-ray intensity measurements is outlined. (3) Circuits for counter voltage stabilization, reliable scaling circuits of both the scale-of-two and decade types, and the double counter system for primary X-ray beam metering have been completed. B. Theory of quartz vibrations. For other reports on this contract see PB 104261-104263, 104265. SIG Contract W36-039-sc-32031, Quarterly report no. 6.

STROBOSCOPIC X-RAY DIFFRACTION EXAMINATION OF PIEZOELECTRICALLY OSCILLATING CRYSTALS. QUARTERLY PROGRESS REPORT TO THE U. S. ARMY. SIGNAL CORPS, 7TH, SEP 1-DEC 1, 1947, by R. Pepinsky. Auburn Research Foundation, Auburn, Ala. Dec 1947. 48p diagrs Mi $2.50, Ph $6.25. PB 104265

Activity during this period has been concerned with the following matters: (1) extension of studies on X-ray intensity measurements; (2) further development of procedures for eliminating the effects of fluctuation in primary X-ray energy; (3) reconstruction of the stroboscopic X-ray tube, to permit higher peak X-ray output; (4) miscellaneous circuit developments; (5) extension of studies on crystal vibrations, and their correlation with structural changes. For other reports under this contract see PB 104261-104264. SIG Contract W 36-039-sc-32031, Quarterly report no. 7.

SURVEY OF LITERATURE PERTAINING TO STRESS DISTRIBUTION IN THE VICINITY OF A HOLE AND THE DESIGN OF PRESSURE VESSELS, by Mervin B. Hogan. Utah. Engineering Experiment Station, Salt Lake City, Utah. Aug 1950. 94p diagrs, graphs Available from The Director, Utah Engineering Experiment Station, Salt Lake City, Utah. PB 103998

This paper presents an exhaustive bibliographical compilation of the work which has been published on the subject of stress distribution in the neighborhood of holes. The author's particular interest in the problem centered on the effect of holes in pressure vessels, consequently the design aspects of that problem are also extensively covered. Bulletin no. 48. Bulletin of the University of Utah vol. 41, no. 2. UU EES B48.

STUDY OF THE BEHAVIOR OF FIXED COMPOSITION RESISTORS DURING PULSED OPERATIONS, by T.J.F. Pavlasek. McGill University. Radio Research Laboratory, Montreal, Canada. Sep 1949. 30f diagrs, graphs, tables Mi $2.00, Enl Pr $5.00. PB 104206

The study of composition type resistors during pulsed operation was directed towards the measurement of the voltage coefficient and its effect on the rating of the resistors. This voltage coefficient appeared insignificant for the metallized types, and only a few of the solid carbon types showed more than a 1% resistance change at voltages of the order of 5000 volts. The JAN-R-11 empirical calculations indicate that a much greater resistance should be obtained. Since the actual measurement of resistance by the pulsed bridge method is obtained when the high voltage pulse is not present, the pulse method measures only residual effects. Therefore, an instantaneous resistance change only during the application of high voltage is quite possible. Third report on the investigation of pulsed conditions, sponsored by the Inter-Service Subcommittee on Electronic Standards and supported by a grant from the Defence Research Board.

TEST OF FENWAL THERMAL SWITCHES SUBJECTED TO EXTREME TEMPERATURE VARIATIONS, MODEL M-110 (C-119B), by E. E. Morton. Fairchild Engine and Airplane Corp., Fairchild Div., Hagerstown, Md. Jul 1949. 14p graphs Mi $1.75, Ph $2.50. PB 104044

Fenwal type thermal switches were tested for extreme temperature operation to determine their stability for use in controlling the heater outlet temperature for the heating and anti-icing systems of the C-119B and XC-120 transport airplanes. The creep of the switches was determined under various conditions of extreme temperature, and creep (^{O}F) was plotted vs total number of cycles, for each switch

tested. The tension type switches had a creep setting of from 10°-30°F, and compression type switches exhibited erratic characteristics with initial creep settings of 0°-35°F, but variable with time of operation up to 70°F in 2300 cycles. It was concluded that the tension type switch was satisfactory for extreme temperature operation. Report no. R110-781.

THEORY OF MAGNETO IONIC TRIPLE SPLITTING, by Olof E. H. Rydbeck. Chalmers University of Technology, Gothenburg, Sweden. 1951. 43p photos, diagrs, graphs Mi $2.50, Ph $6.25. PB 103982

1. Ionosphere - Research - Sweden 2. Chalmers University of Technology, Gothenburg, Sweden. Transactions no. 101 3. Chalmers University of Technology, Gothenburg, Sweden. Research Laboratory of Electronics. Report no. 14.

Generators, Motors, Transmission Distribution, and Allied Equipment

METHODS FOR CALIBRATING STANDARD-SIGNAL GENERATORS, by G. A. Morgan, Jr. U. S. Naval Research Laboratory. Jun 1951. 28p drawings, diagrs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.75. PB 104674

An investigation was made of the problems involved in calibrating standard-signal generators. Signal leakage and several methods for detecting it were studied, since the determination of this leakage is required for accurate calibration. Although reliable information from a number of sources were completed, it was concluded that no available single method of calibration was suitable for all instruments. As far as possible, all known methods for calibrating signal generators were studied to determine if any worth-while improvements in any existing methods appeared possible. Some attempts were made to develop different methods, but no significant results were obtained. NRL R 3821.

RESEARCH AND DEVELOPMENT OF VARIOUS CONFIGURATIONS OF CORE MATERIALS FOR OPTIMUM TRANSFORMER DESIGN. SECOND QUARTERLY REPORT, PERIOD JUL 1-SEP 30, 1949 UNDER CONTRACT W36-039-SC-38255, by C. F. Rains, R. C. McMaster, R. L. Merrill, E. F. Zoltanski and C. F. Salt. Battelle Memorial Institute, Columbus, Ohio. Oct 1949. 34p photos, diagr, graphs Mi $2.25, Ph $5.00. PB 104640

Emphasis has been placed on the construction of test equipment and the procurement of magnetic materials. A semiautomatic B-H loop tracer has been constructed, using an oscilloscope to produce a family of 18 B-H loops in three to four seconds. The loops are enlarged by photography for calculation of the core loss and for plotting the normal magnetization curve from the maximum B and H values of the loop. Equipment has been assembled to check the semiautomatic measurement by the ballistic galvanometer method. Dept. of the Army project: 3-26-00-600. Signal Corps project: 32-2006-3. For 1st report see PB 101752, for 2d report see PB 101753. BMI G-1326.

Miscellaneous

AUTOMATIC CONTROL OF ELECTRODE POTENTIAL, by G. C. Barker. National Research Council of Canada. Atomic Energy Project. Apr 1950. 24p diagrs Available from National Research Council of Canada, Ottawa, Canada. $.20. PB 104655

1. Circuits, Automatic frequency control - Design - Canada 2. Electrodes, Potential - Canada 3. Atomic power - Research - Canada 4. NRCC AEP CRC-440 5. NRCC 2387.

CG CATALYSER TUBES, by S. E. Whitesides, Jr. U. S. Arsenal, Huntsville, Ala. Jun 1946. 16p drawings (2 fold) Mi $1.75, Ph $2.50. PB 104599

1. Tubes, Catalyst.

CHARACTERISTICS OF CESIUM ELECTRON TUBES, SECOND QUARTERLY REPORT, PROGRESS REPORT NO. 6, 1 NOV 1949-1 FEB 1950, UNDER CONTRACT NO. W36-039-SC-44604, by E. E. Burger and J. H. Westbrook. General Electric Co. Research Laboratory, Schenectady, N. Y. Feb 1950. 25p diagrs, graphs, table Mi $2.00, Ph $3.75. PB 104505

Progress made in the study of the characteristics of cesium electron tubes is reported. Leakage measurements were extended to higher ceramic temperatures than previously used; it was found that there is a temperature at which maximum leakage resistance exists. Leakage measurements are to be made on ceramics coated with a cesium-resistant glaze. Studies on metal-ceramic seals were concerned with the addition of new instrumentation, metallographic work and solder flow studies. Copper plating of the metal parts was found to greatly improve the flow of solder on the metal and therefore give better consistency in the production of vacuum-tight seals. Two designs of cesium-vapor thyratrons were developed. Attempts were made to obtain some characteristics of cesium-vapor tubes from measurements on glass tubes. SIG Contract W36-039-sc-44604, Report no. 6.

EVALUATION OF CONTACTS. INTERIM ENGINEERING REPORT, APR 26-JUNE 26, 1950, by Frank Spayth. Mallory, P. R. & Co., Inc., Indianapolis, Ind. Jun 1950. 12p photos, diagrs Mi $1.75, Ph $2.50. PB 104561

Progress is reported in the determination of the proper contact material and atmosphere for different types of loads. Ultimate use of the contacts will be in relays. Materials were selected for evaluation in contact assemblies and for building test equipment including fine silver, tungsten, molybdenum, copper, silver-platinum, gold-nickel and others. Atmospheres were also selected for investigations including air, inert gases, and noninert gases. Capsule design has progressed to the fine point of complete elimination of contact bounce. Glass to metal seals and capsules became available in quantity. Report no. 100-M-2276. Contract AF 33(038)-11772.

MODIFICATION OF STANDARD, SOLID DIELECTRIC, COAXIAL CABLES TO A 50.0 OHM IMPEDANCE LEVEL, by Leo Nadler. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Jul 1951. 17p graph, tables Mi $1.75, Ph $2.50. PB 104653

1. Cables, Coaxial 2. Impedance matching 3. SCEL TM 1394.

Dept. of the Army project: 3-26-00-602. Signal Corps project: 32-2006-3.

FOOD AND KINDRED PRODUCTS

PRECOOLING OF CITRUS FRUITS, by James T. Leggett and George E. Sutton. Florida. Engineering and Industrial Experiment Station, Gainesville, Fla. May 1951. 30p photos, drawing, graphs, tables Available from Florida Engineering and Industrial Experiment Station, University of Florida, Gainesville, Fla. PB 104586

1. Citrus fruit - Precooling 2. F EES B43.

Bulletin series no. 43. Engineering progress at the University of Florida, vol. 5, no. 5, May 1951.

SPECIFIC HEAT OF FOODSTUFFS. PART I: AN EXPERIMENTAL DETERMINATION, BY BYRON E. SHORT. PART II: A MATHEMATICAL AND THERMODYNAMIC DETERMINATION, by Luis H. Bartlett. Texas. University. Bureau of Engineering Research. Jan 1943. 37p drawing, graphs, tables Available from Bureau of Engineering Research, University of Texas, Austin, Texas. PB 104498

1. Specific heat - Computation 2. Food - Specific heat 3. Calorimeters 4. TU ERS 40.

University of Texas publication no. 4432.

FUELS AND LUBRICANTS

AMERIKANISCHE GASWIRTSCHAFT, ERFAHRUNGEN EINER DEUTSCHEN STUDIENKOMMISSION IN USA (AMERICAN GAS INDUSTRY, REPORT OF A GERMAN COMMISSION TO USA), by Heinrich Kaun, Alfred Mette, Ernst Michel, Paul Schenk. Rationalisierungs-Kuratorium der Deutschen Wirtschaft (RKW) Auslandsdienst. 1951. 184p drawings, diagrs, graphs, tables Mi $6.75, Ph $23.75. PB 104617

1. Gas - Manufacture 2. Gas industry.

Schriftenreihe heft 6.

ANILIN PUNKT VON ERDÖLFRAKTIONEN (ANILINE POINT OF MINERAL OIL FRACTIONS), by J. J. Leendertse, H. Huppes and W. van Slooten. N.V. de Bataafsche Petroleum Maatschappij, Amsterdam. Sep 1944. 35f drawings, graphs, tables (Text in German) Mi $2.25, Enl Pr $6.25. PB 104179

1. Mineral oils - Analysis - Netherlands 2. Aniline point determination - Netherlands 3. Hydrocarbon oils - Fractionation - Netherlands 4. Micro BIOS FD 2874/46, Item 86, Frames 002296-002329.

Abstract available as PB 104179s. 2p. Mi $1.25, Ph $1.25. Report no. 9263.

CALCULATION OF THE SPECIFIC IMPULSE OF ROCKET PROPELLANTS, by Rudolph Edse. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. May 1948. 69p diagr, graphs (1 fold) tables Mi $3.00, Ph $8.57. PB 104189

This report presents a new method for calculating the specific impulse of rocket propellants. All data required for such calculations are included in tables and graphs. The report also includes a derivation of thermodynamic principles upon which the method is based. The exact calculation is compared with the results obtained when employing the Equation of Bernoulli. A graphical method is presented which permits a rapid determination of the specific impulse values of rocket fuels. Project no. DP-167. AAF TR 1164-ND.

CONSUMPTION OF ENERGY IN FISCHER-TROPSCH SYNTHESIS, 1942-1944. Ruhrchemie A. G., Oberhausen-Holten, Ger. May 1944. 14f diagr, tables (Text in German) Mi $1.75, Enl Pr $3.75. PB 101058

1. Fischer - Tropsch process - Germany 2. Micro BIOS FD 83/48, Frames 1-13.

English abstract included. Abstract available as PB 101058s. 1p. Mi $1.25, Ph $1.25.

CORRELATION OF PHYSICAL PROPERTIES WITH MOLECULAR STRUCTURE FOR DICYCLIC HYDROCARBONS. II: 2-ALKYLBIPHENYL AND THE TWO ISOMERIC 2-ALKYLBICYCLOHEXYL SERIES, by Irving A. Goodman and Paul H. Wise. U. S. National Advisory Committee for Aeronautics. Jul 1951. 21p graphs, tables Mi $2.00, Ph $3.75. PB 104601

Three homologous series of related dicyclic hydrocarbons are compared on the basis of the following physical properties: net heat of combustion, density, melting point, boiling point, and kinematic viscosity. The three series investigated are the 2-alkylbiphenyl, and the high- and low-boiling 2-alkylbicyclohexyl series through C_{16}. Comparisons are made on the following bases: (1) as members of an homologous series in which the compounds have similar structures and differ in molecular weight; (2) as isomers with the same molecular formula but different molecular structure due to branching of the side chain or geometrical isomerism; and (3) as compounds with the same carbon skeleton but different molecular formula due to hydrogenation of the aromatic ring. NACA TN 2419.

DRAFTS OF PATENT APPLICATIONS RELATING TO THE PRODUCTION OF MOTOR SPIRITS BY CATALYTIC POLYMERIZATION, AND RELATED PROCESSES. Ruhrchemie A. G., Oberhausen-Holten, Ger. 1936-1942. 66f diagrs, graphs, tables (Text in German) Mi $3.00, Enl Pr $10.00. PB 104168

1. Gasoline - Polymerization - Patents - Germany 2. Gasoline, Anti-knock - Production - Patents - Germany 3. Micro BIOS FD 5451/47, Frames 1-61.

Abstract available as PB 104168s. 3p. Mi $1.25, Ph $1.25. No patent application numbers given.

FRICTION AT HIGH SLIDING VELOCITIES OF OXIDE FILMS ON STEEL SURFACES BOUNDARY LUBRICATED WITH STEARIC-ACID SOLUTIONS, by Robert L. Johnson, Marshall B. Peterson and Max A. Swikert. U. S. National Advisory Committee for Aeronautics. May 1951. 29p photos, graphs Mi $2.00, Ph $3.75. PB 103788

Friction experiments indicated that lubrication with stearic acid as an additive in cetane was effective at sliding velocities up to 3000 feet per minute both for clean steel surfaces and for surfaces coated with Fe_2O_3 (1000 A thick). A prepared film of Fe_3O_4 (1000 A thick) prevented lubrication failure with 0.5-percent stearic acid in cetane at sliding velocities higher than 7000 feet per minute. It is suggested that the lubrication failures found at a sliding velocity of 3000 feet per minute are caused by the melting of the metallic soap formed at the liquid metal interface. The type of oxide and the film thickness are important in determining the effectiveness of stearic acid as an additive in lubrication at high sliding velocities. NACA TN 2366.

HYPODYNAMIC LUBRICATION OF SECTOR-SHAPED PADS, by Ronald S. Brand. Connecticut. Engineering Experiment Station, Storrs, Conn. Dec 1950. 12p diagrs, graphs Available from Connecticut. Engineering Experiment Station, Storrs, Conn. PB 104587

1. Lubricants - Pressure distribution 2. Fittings, Lubricating 3. Reynolds equation 4. Pads, Sector-shaped - Lubrication 5. Bearings, Thrust - Lubrication 6. Bearings, Sector-shaped - Lubrication 7. Bearings - Lubrication 8. CEES B6.

Bulletin no. 6.

LOG SHEETS RELATING TO EXPERIMENTS FOR IRON CATALYST SYNTHESIS. Ruhrchemie A. G., Oberhausen-Holten, Ger. 1942-1944. 652f (Text in German) Mi $9.00, Enl Pr $86.25. PB 104172

1. Gasol (Trade name) 2. Gasoline - Synthesis - Germany 3. Catalysts, Iron - Germany 4. Micro BIOS FD 3351/48, Frames 1-309 5. Micro BIOS FD 3351/48, Frames 410-640 6. Micro BIOS FD 3351/48, Frames 650-738.

Abstract available as PB 104172s. 1p. Mi $1.25, Ph $1.25.

LUBRICATING OIL SYNTHESIS; CONTINUOUS DECHLORINATION; POLYMERIZATION OF DIESEL OIL FRACTIONS; DESCRIPTION OF A PLANT FOR THE ANNUAL PRODUCTION OF 12,000 TONS OF LUBRICATING OIL. Ruhrchemie A. G., Oberhausen-Holten, Ger. 1935-1945. 96f graphs, tables (Text in German) Mi $4.25, Enl Pr $13.75. PB 104169

1. Lubricating oils - Production - Plants - Germany 2. Lubricating oils - Synthesis - Germany 3. Oils, Diesel - Polymerization - Germany 4. Micro BIOS FD 5608/47, Frames 1-95.

Abstract available as PB 104169. 3p. Mi $1.25, Ph $1.25.

NOTES ON MOTOR FUELS, IMPROVEMENT OF OCTANE NUMBER, ETC. Triebstoffwerk Rheinpreussen, Homberg, Ger. 1937-1944. 44f tables (Text in German) Mi $2.50, Enl Pr $7.50. PB 101061

1. Fuels, Automotive - Germany 2. Gasoline - Octane number - Germany 3. Micro BIOS FD 40/48, Frames 1-42.

English abstract included. Abstract available as PB 101061s. 2p. Mi $1.25, Ph $1.25.

REPORTS AND GRAPHS RELATING TO FUEL TESTS. I. G. Farbenindustrie A. G., Ludwigshafen, Ger. 1937-1944. 61f drawings, graphs, tables (Text in German) Mi $3.00, Enl Pr $10.00. PB 103881

1. Jet engines - Fuels - Tests - Germany 2. Caps, Percussion - Germany 3. Micro BIOS FD 2872/46, Item 30, Frames 3545-3605.

Abstract available as PB 103881s. 1p. Mi $1.25, Ph $1.25.

SOLVENT EXTRACTION OF COTTONSEED OIL WITH ISOPROPANOL, by W. D. Harris and J. W. Hayward. Texas. Engineering Experiment Station, College Station, Tex. Sep 1950. 74p photo, diagr, drawing, graphs, tables Available from Texas. Engineering Experiment Station, College Station, Tex. PB 104585

1. Cottonseed oil - Production 2. Isopropanol - Use in extraction of cottonseed oil 3. Texas. Agricultural and Mechanical College, College Station, Tex. 4. Cotton Research Committee of Texas 5. TU EES B 121.

Bulletin 121. Publication resulting from cooperative research on cottonseed processing by the Cotton Research Committee of Texas and the Texas Engineering Experiment Station. Agricultural and Mechanical College of Texas. Bulletin ser. 5, vol. 6, no. 9, September 1, 1950.

SPECTROSCOPIC STUDIES OF A LOW-PRESSURE COMBUSTION FLAME. I: A TWO-PATH METHOD FOR MEASURING FLAME TEMPERATURES AND CONCENTRATIONS, by S.S. Penner. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Mar 1950. 23p photos, graphs, tables Mi $2.00, Ph $3.75. PB 104562

1. Flame - Temperature - Measurement 2. Flame - Spectrographic analysis.

Contract no.W33-038-ac-4320. Power Plant Lab. Project no. MX527. ORDCIT Project, Contract no W-04-200-ORD455, Progress report no. 3-17.

SYNTHESIS, PURIFICATION, AND PHYSICAL PROPERTIES OF HYDROCARBONS OF THE NAPHTHALENE SERIES. I: 1-METHYLNAPHTHALENE, 1-ETHYLNAPHTHALENE, 1-BUTYLNAPHTHALENE AND 1-ISOBUTYL-NAPHTHALENE, by Harold F. Hipsher and Paul H. Wise. U. S. National Advisory Committee for Aeronautics. Aug 1951. 19p Mi $1.75, Ph $2.50. PB 104723

The synthesis, purification, and several physical properties of four 1-alkylnaphthalenes are described. In each case, the hydrocarbon was synthesized from 1-naphthylmagnesium bromide by well-known methods. The final hydrocarbons were purified by fractional distillation to obtain a final product with a calculated purity higher than 99 mole percent. The physical properties, determined for material having a calculated purity of 99.8 mole percent or higher, include melting point, boiling point, index of refraction, density, kinematic viscosity at four temperatures, heat of fusion, and heat of combustion. Time-temperature melting curves and infrared spectra are presented. NACA TN 2430.

ÜBERBLICK ÜBER DIE BRIKETTIERUNG VON BRAUNKOHLE UND STEINKOHLE (BRIQUETTING OF SOLID FUEL), by Dr. Thau. Deutscher Normenausschuss E. V. Fachkommission Brikettierung von Festen Brennstoffen. Oct 1946. 63f photo, drawings, tables (Text in German) Mi $3.00, Enl Pr $10.00. PB 103886

1. Coal - Briquetting - Germany 2. Lignite - Briquetting - Germany 3. Peat - Briquetting - Germany 4. Micro BIOS FD 2934/46, Frames unnumbered.

Abstract available as PB 103886s. 2p. Mi $1.25, Ph $1.25. Microfilms are numbered 79.01-79.03.

VISKOSITÄT VON 50 SCHMIERÖLEN UNTER DRUCK EN BIS ZU 2000 ATMOSPHÄREN (VISCOSITIES OF 50 LUBRICATING OILS UNDER PRESSURES UP TO 2,000 ATMOSPHERES), by E. Kuss. Nov 1950. 30p drawings, graphs, tables Mi $2.00, Ph $3.75. PB 104688

1. Lubricating oils - Viscosity - Germany 2. Clausthal-Zellerfeld. Bergakademie. Physikalisches Institut 3. DSIR SR17.

Translation of report from Physikalisches Institut der Bergakademie, Clausthal-Zellerfeld.

HIGHWAYS AND BRIDGES

APPLICATION OF COLD-MASTIC ASPHALT COMPOUNDS TO THE SEALING OF JOINTS AND CRACKS IN RIGID PAVEMENTS. Kentucky. University. Engineering Experiment Station. Highways Materials Research Laboratory. Mar 1951. 27p photos Available from Engineering Experiment Station, University of Kentucky, Lexington, Ky. PB 103868

1. Roads - Surface treatment - Bituminous materials 2. Asphalt - Uses 3. Pavements, Concrete - Maintenance and repair.

Bulletin no. 19.

PAVEMENT DESIGN FOR ROADS AND AIRFIELDS, by E. H. Davis. Gt. Brit. Dept. of Scientific and Industrial Research. Road Research Laboratory, Harmondsworth, England. Dec 1950. 57p diagrs, drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.45. PB 104581

1. Roads - Surface treatment - Gt. Brit. 2. Airports - Pavements - Design - Gt. Brit. 3. Landing fields - Pavements - Design - Gt. Brit. 4. Pavements - Design - Gt. Brit. 5. Runways - Pavements - Design - Gt. Brit. 6. DSIR RR TP 20.

Title page is dated 1951. S. O. Code no. 47-110-20.

REPORT OF THE ROAD RESEARCH BOARD, WITH THE REPORT OF THE DIRECTOR OF ROAD RESEARCH FOR THE YEAR 1949. Gt. Brit. Dept. of Scientific and Industrial Research. Road Research Laboratory, Harmondsworth, England. 1951. 120p photos, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 103925

1. Roads - Research - Gt. Brit.

Frank E. Smith, Chairman. W. H. Glanville, Director. S. O. Code no. 47-98-0-49.

SCOUR AROUND BRIDGES. Highway Research Board. Apr 1951. 28p photos, drawings, graphs, tables Available from Highway Research Board, National Research Council, 2101 Constitution Ave., N. W., Washington, D. C. $.45. PB 104083

1. Bridges - Foundations and piers 2. Bridges - Construction 3. HRB PR no. 13-B.

Presented at the 30th annual meeting 1951. Contents: Progress report of model studies of scour around bridge piers and abutments, by Emmett M. Laursen. - Investigation of flexible mats to reduce scour around bridge piers, by C. J. Posey, D. W. Appel and E. Chamness, Jr.

INSTRUMENTS

BETA-RAY THICKNESS GAUGES, by W. R. Dixon. National Research Council of Canada. Div. of Physics. Radiology Laboratory. May 1951. 15p photo, diagrs, graphs, table Available from National Research Council of Canada, Ottawa, Canada. $.15. PB 104520

1. Beta rays - Measurements 2. Instruments, Radiation detection 3. NRCC 2358.

DETECTION OF RADIOACTIVITY WITH SCINTILLATION COUNTERS, by George Cowper. National Research Council of Canada. Atomic Energy Project. Aug 1950. 11p graphs Available from National Research Council of Canada, Ottawa, Canada. $.15. PB 104659

1. Detectors, Scintillation - Canada 2. Radioactivity - Detection - Canada 3. Atomic power - Research - Canada. 4. NRCC AEP CREL-454 5. NRCC 2391.

DEVELOPMENT OF AN HERMETICALLY SEALED MINIATURE THERMOSTAT: FINAL PROGRESS REPORT ON SIGNAL CORPS CONTRACT NO. W36-039-SC-44553 FROM MAY 25, 1949 TO FEBRUARY 28, 1951. Stevens Manufacturing Co., Inc., Mansfield, Ohio. Feb 1951. 38p photos, drawings, tables Mi $2.25, Ph $5.00. PB 104286

1. Thermostats, Hermetically sealed - Miniature 2. SIG Contract W36-039-sc-44553, Final report.

DEVELOPMENT OF EXPERIMENTAL EQUIPMENT TO MEASURE THE ELECTRICAL RESISTIVITY OF MAGNESIUM-BASE ALLOYS AT ELEVATED TEMPERATURES, by Arthur B. Backensto, Jr. Jan 1950. 52p photos, diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 104506

The development of experimental equipment to measure the electrical resistivity of magnesium-base alloy systems while specimens are held at elevated temperatures is described. The equipment allows phase boundaries to be established for high-purity magnesium-base-alloys and also can be used to follow phase changes. The basic units of the equipment comprise a mounting fixture for specimens, an enclosure allowing a protective atmosphere for specimens, the electrical-resistance furnace, and electrical circuits for measurement and for passing current through the specimens. Assembly of the equipment has been completed and preliminary observations made of its operation. Thesis-Rensselaer Polytechnic Institute.

EXPERIMENTAL STUDY OF AN ANGLE-OF-ATTACK VANE MOUNTED AHEAD OF THE NOSE OF AN AIRPLANE FOR USE AS A SENSING DEVICE FOR AN ACCELERATION ALLEVIATOR, by Christopher C. Kraft, Jr. and Arthur Assadourian. U. S. National Advisory Committee for Aeronautics. Jul 1951. 8p photo, diagrs, graphs Mi $1.25, Ph $1.25. PB 104539

Tests have been made in flight to determine the ability of an angle-of-attack vane mounted ahead of the nose of an airplane to measure the average angle of attack over the entire wing in flight through rough air. Results show that a good measure of the angle of attack can be obtained. NACA TN 2415.

GÖTTINGEN MATHEMATICAL CONFERENCE, 15TH TO 20TH APRIL, 1947. REPORTED BY B. W. CONOLLY. B.I.O.S. TRIP NO. 3266. British Intelligence Objectives Sub-Committee. n.d. 57p photos, diagrs, graphs Mi $2.75, Ph $7.50. PB 104521

1. Mathematical instruments - Germany 2. Calculators - Germany 3. Computers - Germany 4. Integrators - Germany 5. BIOS FR 1804.

Includes Appendix I: Development of mathematical instruments in Germany 1939-1945. The IPM-Ott integrator, for solving ordinary differential equa-

tions, by H. J. Dreyer. Translated by British Naval Gunnery Mission, Apr 1947. - Appendix II. Note by K. Zuse on his computing machine.

HYGRAPH INSTRUCTION MANUAL, by Leopold Rooner. Massachusetts Institute of Technology. Radiation Laboratory. Aug 1945. 32p photos, drawings Mi $2.25, Ph $5.00. PB 104710

The Hygraph Instrument, a mechanical cord device for quantitative plotting of hyperbolas over large areas, and for precise construction of closely approximated delay curves over suitable maps and charts is described with instructions for proper operation and care of the equipment. NDRC Div 14, OEMsr-262. MIT Rad Lab M-230.

IMPROVEMENT IN ELECTRIC COMPUTER NETWORKS FOR SOME ELASTIC STRUCTURES, by B. Langefors. Svenska Aeroplan Aktiebolaget, Linköping, Sweden. 1951. 16p diagrs, graphs Mi $1.75, Ph $2.50. PB 102927

1. Computers, Analog - Sweden 2. Computers, Electrical - Sweden 3. Networks, Electrical - Sweden 4. Mathematics, Applied - Aerodynamics - Sweden. SAAB TN 1.

INVESTIGATIONS OF THE MEASUREMENT OF NOISE. PROGRESS REPORT NO. 20, JAN 1-MAR 31, 1951. REPORT OF DEVELOPMENT WORK UNDER CONTRACT NOBSR 49128, INDEX NE-120803, by Conrad J. Fowler and Frank T. Nicholson. Pennsylvania. University. Moore School of Electrical Engineering, Philadelphia, Pa. Apr 1951. 32p diagrs, graphs (part fold) Mi $2.25, Ph $5.00. PB 104670

1. Noise - Measurement 2. Meters, Sound. Research Division report 51-31. For progress reports 1-19 see PB 85974-85981, 110114-110119, 101545-101546, 103055-103057.

LINDQUIST-RYAN TENSIOMETER (MODIFIED), by Norris N. Murray. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 6p photos Mi $1.25, Ph $1.25. PB 104305

1. Tensiometers 2. AAF TSEAA MR 670-21T. DCRDM-670-21T.

PHYSICAL CHARACTERISTICS OF WIRE RESISTANCE STRAIN GAUGES, by Eric Jones and Miss. K. R. Maslen. Gt. Brit. Royal Aircraft Establishment, Farnborough, Eng. Nov 1948. 76p diagrs, graphs, tables Mi $3.50, Ph $10.00. PB 104395

The fundamental principles of the wire resistance strain gage are discussed. Types of strain gages in common use and their methods of construction are described, and the mechanism whereby strain affects change of resistance is discussed. Methods are given of overcoming possible causes of error including the effects of humidity and temperature. The effect of the passage of current on the strain gages is described and methods of increasing the output are suggested. The behavior of fine wires is discussed as well as the miscellaneous properties of the wire resistance strain gage. Report no. Instn. 2. U.D.C. no. 539.387.082.73.

THE PULSE INTEGRATOR. PART A: DESCRIPTION OF THE INSTRUMENT AND ITS CIRCUITRY, by Edwin L. Williams, Jr. Massachusetts Institute of Technology. Dept. of Meteorology. Aug 1949. 36p photos, diagrs, graphs, table Mi $2.25, Ph $5.00. PB 104281

This report describes an instrument whose purpose is to measure the peak amplitude of very short time-duration pulses. More fully, it measures and records the average peak amplitude of a number of pulses whose peak values may be quite widely different. Complete design data are given for the circuits used. Weather radar research. Technical report no. 8 under Contract W36-039-sc-32038. Dept. of the Army project: 3-99-05-022. Signal Corps project: 122 B-O.

PULSE-LENGTH DISCRIMINATOR, by Clark C. Watterson. U. S. Naval Research Laboratory. Jul 1951. 16p photos, diagrs, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 104730

The described pulse-length discriminator, when fed video pulses of mixed lengths, will deliver at its output one short pulse of fixed length for each input pulse whose length lies between L and L + ΔL can be controlled between 0.30 and 30.0 μsec and Δ L can have the values 0.13, 0.30, 1.0, and 3.0 μsec. By setting L successively to different values and counting input and output pulses, the distribution of the input pulse lengths can be determined. NRL R 3838.

SIMULATOR FOR STUDYING HUMAN FACTORS IN AIR TRAFFIC CONTROL SYSTEMS, BY BEATRICE E. JOHNSON, A. C. WILLIAMS, JR. AND S. N. ROSCOE, WITH AN APPENDIX: DIAGRAMS AND TECHNICAL DESCRIPTIONS OF THE COMPONENTS OF THE AIR TRAFFIC CONTROL SIMULATOR, by Michael J. Schwetz. U. S. Bureau of Medicine and Surgery. Div. of Aviation Medicine. Jun 1951. 37p drawings, diagrs, table Mi $2.25, Ph $5.00. PB 104317

1. Airports - Air traffic control 2. Simulators - Design 3. Illinois. University 4. National Research Council. Committee on Aviation Psychology 5. NRC CAP no. 11.

Report on research conducted at the Univ. of Illinois under the auspices of the National Research Council Committee on Aviation Psychology, under Task order IX, Contract no. N7onr-291, with funds provided by the Division of Aviation Medicine, Bureau of Medicine and Surgery and the Bureau of Aeronautics, U. S. Navy, through the Office of Naval Research, with supplementary support by the Special Devices Center and the University of Illinois.

VALVE FOR GLASS BLOWING ON APPARATUS CONTAMINATED WITH RADIO ACTIVE OR TOXIC SUBSTANCES, by F. T. Birks. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Feb 1951. 5f diagr Mi $1.25, Enl Pr $1.50. PB 104359

1. Valves, Glass blowing - Design - Gt. Brit. 2. Atomic power - Research - Gt. Brit. 3. Micro AERE C/M 97 4. Micro BRR 4/51, Frames 1-4. Abstract included. Abstract available as PB 104359s. 1p. Mi $1.25, Ph $1.25.

LUMBER AND WOOD PRODUCTS

ADAPTATION OF TAXATION TO JAPAN'S FOREST POLICY, by R. Clifford Hall. Supreme Commander for the Allied Powers. Natural Resources Section. Jun 1951. 36p table Mi $2.25, Ph $5.00. PB 104631

1. Forests and forestry - Taxation - Japan 2. Taxation - Japan 3. SCAP NRS PS 57.

IMPROVED FOREST PLANTING AND NURSERY PRACTICES FOR JAPAN, by Floyd M. Cossitt. Supreme Commander for the Allied Powers. Natural Resources Section. Jul 1951. 50p photos, drawings, tables Mi $2.50, Ph $6.25. PB 104726

1. Forests and forestry - Planting - Japan 2. Plant breeding - Research - Japan 3. Nurseries (Horticulture) - Japan 4. SCAP NRS PS 61.

PAINTING WOODWORK. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, Eng. May 1951. 6p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 104741

1. Painting - Gt. Brit. 2. Paints - Application - Gt. Brit. 3. Wood - Preservation - Gt. Brit. 4. Woodwork - Painting - Gt. Brit. 5. DSIR BRD 30. S. O. Code 72-22-0-30.

SKURUTBYTTETS VARIASJON MED SKURORDRE, TOMMERDIMENSJON OG AVSMALNING VED EN MODERNE SIRKELSAG (LUMBER RECOVERY FROM A MODERN CIRCULAR SAW), by Gustav G. Klem and Ole Karlsen. Norsk Treteknisk Institutt. 1951. 26p drawings, graphs, tables (Text in Norwegian and English) Mi $2.00, Ph $3.75. PB 104319

1. Saws, Circular - Norway 2. Lumber - Production - Norway.

Summary in English. Meddelelser fra Norsk Treteknisk Institutt nr. 1. Skogbrukets og Skogindustrienes Forskningsforening Meddelelse nr. 7.

MACHINERY

AUSFLUSS VON GASEN UND DÄMPFEN AUS LANGEN ROHRLEITUNGEN (EXHAUST OF GASES AND VAPORS FROM LONG PIPE LINES), by Bernhard. Deutsche Werke Kiel A. G., Kiel, Ger. Aug 1942. 16f graphs (Text in German) Mi $1.75, Enl Pr $3.75. PB 103814

1. Exhaust gases - Germany 2. Steam pipe lines - Germany 3. Micro BIOS FD 1024/50, Frames 1-14.

English abstract included. Abstract available as PB 103814s. 1p. Mi $1.25, Ph $1.25. Report no. 142/4329.

CORRECT USE OF GAS HEATERS TO PREVENT SWEATING. Texas. Engineering Experiment Station, College Station, Texas. Feb 1947. 4p drawings Available from Texas Engineering Experiment Station, College Station, Tex. PB 103701

1. Gas heaters - Ventilation 2. TU EES L 1.

DRAWINGS OF PLANT AND MACHINERY FOR CELLULOSE ACETATE PRODUCTION AND KINDRED PRODUCTIONS. I. G. Farbenindustrie A. G., Dormagen, Ger. 1934-1946. 298f drawings only (Legends in German) Mi $9.00, Enl Pr $40.00. PB 104362

1. Cellulose acetates - Production - Germany 2. Cellulose plants - Germany 3. Machinery - Design - Germany 4. Micro BIOS DOCS 2827/1896 5. Micro BIOS FD 592/49, Frames 1-77.

Drawings in photostat form are PB 104362s. Abstract available as PB 104362s2. 1p. Mi $1.25, Ph $1.25.

DRAWINGS RELATING TO 5,000 AND 20,000 KW. GAS TURBINES, AND CALCULATIONS FOR A 7500. H.P. GAS TURBINE WITH INTERNALLY COOLED BLADES. Holzwarth Gasturbinen G.m.b.H., Mülheim, Ger. 1944-1946. 39f drawings (Text in German) Mi $2.25, Enl Pr $6.25. PB 103985

1. Turbines, Gas - Design - Germany 2. Turbines - Blades, Internally cooled - Germany 3. Micro BIOS FD 1051/50, Frames 1-24.

Abstract available as PB 103985s. 1p. Mi $1.25, Ph $1.25.

DRUCKVERTEILUNG UND LAST IM 360°-GLEITLAGER IM BEREICH DER GEDRUNGENHEITEN (VERHÄLTNIS VON DURCHMESSER ZUR LÄNGE) B-O BIS B-8 FÜR DIE ECCENTRIZITÄTEN C-O.1 BIS C-.95 (PRESSURE DISTRIBUTION AND LOAD IN A 360° JOURNAL BEARING, FOR VALUES OF THE CHARACTERISTIC B (RATIO OF DIAMETER TO LENGTH) FROM 0 TO 8, AND ECCENTRICITES C-0.1 TO C-0.95), by A. Walther and H. Sassenfeld. 1950. 56p graphs, tables Mi $2.75, Ph $7.50. PB 104685

1. Bearings, Journal - Load - Germany 2. Bearings, Journal - Pressure distribution - Germany 3. Darmstadt. Technische Hochschule. Institut für Praktische mathematik 4. DSIR SR 11.

Translation of Institut für Praktische mathematik. Lager-und schmierungsprobleme bericht nr. 8.

DRUCKVERTEILUNG UND LAST IN 360°-LAGER BEI VERKANTETER WELLE. ABRISS DEE VORGEHENS MIT ERLAUTERUNGSBEISPIEL (PRESSURE DISTRIBUTION AND LOAD IN A 360° BEARING WITH AN INCLINED SHAFT. OUTLINE OF PROCEDURE WITH AN EXPLANATORY EXAMPLE), by A. Walther and H. Sassenfeld. Aug 1950. 8p diagrs, graphs Mi $1.25, Ph $1.25. PB 104687

1. Bearings, Journal - Load - Germany 2. Bearings, Journal - Pressure distribution - Germany 3. Darmstadt. Technische Hochschule. Institut für Praktische mathematik 4. DSIR SR 13.

Translation of Institut für Praktische Mathematik, Technische Hochschule, Darmstadt. Lager-und schmierungsprobleme bericht nr. 9.

EINFLUSS DER VERFORMUNG UND DER LAGERFEHLER AUF DIE TRAGFÄHIGKEIT VON ZAHNRADGETRIEBEN. TEILE I: ELASTISCHE FORMÄNDERUNG DER ZAHNE UND ANSCHLIESSENDEN TEILE RADKORPER (DEFORMATION OF LOADED GEARS AND THE EFFECT ON THEIR LOAD-CARRYING CAPACITY. PART I: ELASTIC DEFORMATION OF THE TEETH AND THE ADJOINING PARTS OF THE BODY OF THE WHEEL), by C. Weber. Feb 1949. 23p diagrs, graphs, table Mi $2.00, Ph $3.75. PB 104677

1. Gears - Deformation - Germany 2. Elasticity modulus - Determination - Germany 3. Bearings,

Gear-shaft - Deformation - Germany 4. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 5. DSIR SR3.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 102.

EINFLUSS DER VERFORMUNG UND DER LAGERFEHLER AUF DIE TRAGFÄHIGKEIT VON ZAHNRADGETRIEBEN. TEIL V: VERTEILUNG DER BELASTUNG BEI BERÜCKSICHTIGUNG DER VERFORMUNG DES RITZELKORPERS UND DER ZÄHNE (DEFORMATION OF LOADED GEARS AND THE EFFECT ON THEIR LOAD-CARRYING CAPACITY. PART V: DISTRIBUTION OF THE LOAD, TAKING INTO CONSIDERATION THE DISTORTION OF THE PINION BODY AND THE TEETH), by C. Weber and K. Banaschek. Jan 1950. 32p diagrs Mi $2.25, Ph $5.00. PB 104680

1. Gears - Deformation - Germany 2. Gears - Load distribution - Germany 3. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 4. DSIR SR6.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 118.

EXPERIMENTAL IRIDIUM IRIDIUM-RHODIUM THERMOCOUPLE WITH COOLED SUPPORT, by Andrew I. Dahl. U. S. National Bureau of Standards. Jul 1949. 10p photo, drawing, diagr, tables Mi $1.25, Ph $1.25. PB 103750

An investigation was conducted of thermocouples suitable for use with after burning or ram-jet applications. An iridium iridium-rhodium temperature probe showed no signs of deterioration upon removal from the test installation. The thermoelements had actually become brighter. No other temperature measuring instrument was available for direct temperature comparison, however, a gas analysis method indicated gas temperatures in the ramjet of about 3300°F. One of the major disadvantages of the combination Ir-IrRh is its relatively low thermoelectric power, which is approximately one-tenth of Chromel-Alumel. This is not excessive in applications where high sensitivity is of little value because of the large temperature gradients which exist in the gas.

GAS TURBINE DESIGN BASED ON FREE VORTEX FLOW, by E. A. Simonis and J. Reeman. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1944. 23p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $1.15. PB 104411

The design of a turbine stage is considered on the basis of free vortex flow from the nozzles and blades and some of the factors which limit the design of an efficient turbine stage are discussed. As the flow conditions at the root of the blades are of greater importance in limiting the design than those at the mean diameter, calculations of the stage performance are made for various values of nozzle angle, reaction and exhaust swirl at the inner diameter of the nozzles and blades. The results of these calculations are presented in the form of a series of curves which show how the design conditions, such as mass flow per unit annulus area, rim speed and Mach numbers relative to the blades, vary with work output from the turbine stage. These curves enable a quick estimate to be made of a suitable turbine stage design to meet given requirements of mass flow and work output, and an example is given showing their application. Cover date is 1951. S. O. Code no. 23-2541. ARC RM 2541.

HEAT TRANSFER AND PRESSURE DROP IN HEAT EXCHANGERS, by Byron E. Short. Texas. University. Bureau of Engineering Research. Jun 1943. 55p drawings, graphs, tables Available from Bureau of Engineering Research, University of Texas, Austin, Texas. PB 104497

1. Heat exchangers 2. Heat - Transference 3. Pressure drop 4. TU ERS 37.

University of Texas publication no. 4324.

INCREASED PRODUCTION, REDUCED COSTS THROUGH A BETTER UNDERSTANDING OF THE MACHINING PROCESS AND CONTROL OF MATERIALS, TOOLS, MACHINES. Curtiss-Wright Corporation, Wood-Ridge, N. J. 1950. 157p photos, diagrs, graphs Available from Curtiss-Wright Corp., Wood-Ridge, N. J. $2.40. PB 104549

1. Tools, Machine - Operation 2. Metals - Machinability 3. Metals - Microstructure.

INVESTIGATION OF 75-MILLIMETER-BORE CYLINDRICAL-ROLLER BEARINGS AT HIGH SPEEDS. III: LUBRICATION AND COOLING STUDIES: OIL INLET DISTRIBUTION, OIL INLET TEMPERATURE, AND GENERALIZED SINGLE-OIL-JET COOLING-CORRELATION ANALYSIS, by E. Fred Macks and Zolton N. Nemeth. U. S. National Advisory Committee for Aeronautics. Jul 1951. 47p photo, drawings, graphs, tables Mi $3.50, Ph $6.25. PB 104602

Oil inlet distribution (5 methods were investigated) and oil inlet temperature (100° to 205° F) were found to be significant factors in the cooling effectiveness of a given quantity of oil. Dimensional analysis was used to generalize the test-rig results so that it is possible to predict the inner- or outer-race temperatures above oil inlet temperature from a single curve regardless of whether speed, load, oil flow, oil inlet temperature, oil-jet diameter or any combination of the parameters is varied. NACA TN 2420

KEY TO PRODUCTIVE NUT RUNNING. U. S. Bureau of Ships. Jul 1951. 11p photos Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 104611

1. Wrenches, Torque indicating 2. Wrenches, Impact 3. Nuts - Installation 4. NAVSHIPS IN 112.

PULSATORVERSUCHE; EINFLUSS DER ZAHNFORM AUF DIE ZAHNFUSSFESTIGKEIT VON STIRNRADERN MIT GERADEN ZAHNEN AUS WEICHEM, VERGUTETEM UND EINSATZGEHARTETEM STAHL (PULSATOR TESTS; INFLUENCE OF TOOTH SHAPE ON THE ROOT STRENGTH OF STRAIGHT SPUR GEARS MADE FROM MILD, HEAT TREATED AND CASE HARDENED STEELS), by H. Glaubitz. Jun 1950. 39p photos, diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104686

1. Gears, Spur - Strength - Effect of tooth shape - Germany 2. Pulsator tests - Germany 3. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 4. DSIR SR 12.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 124.

RAPID APPROXIMATE METHOD FOR DETERMINING VELOCITY DISTRIBUTION ON IMPELLER BLADES OF CENTRIFUGAL COMPRESSORS, by John D. Stanitz and Vasily D. Prian. U. S. National Advisory Committee for Aeronautics. Jul 1951. 31p diagrs, graphs Mi $2.25, Ph $5.00. PB 104603

A rapid approximate method of analysis was developed for both compressible and incompressible, nonviscous flow through radial- or mixed-flow centrifugal compressors with arbitrary hub and shroud contours and with arbitrary blade shape. The method of analysis is used to determine approximately the velocities everywhere along the blade surfaces, but no information concerning the variation in velocity across the passage between blades is given. In eight numerical examples for two-dimensional flow, covering a fairly wide range of flow rate, impeller-tip speed, number of blades, and blade curvature, the velocity distribution along the blade surfaces was obtained by the approximate method of analysis and compared with the velocities obtained by relaxation methods. NACA TN 2421.

SILENCERS AND EXHAUST PIPES, by H. Buschmann. n.d. 5f drawings Mi $1.25, Enl Pr $1.50. PB 104019

1. Automotive parts - Germany 2. Engines, Automotive - Exhaust pipes - Germany 3. Engines, Automotive - Silencers - Germany 4. Silencers, Exhaust - Germany 5. Exhaust pipes - Germany 6. Micro RTP/T2583 7. Micro NAVSHIPS 01837-46.

Translated from Taschenbuch für den auto-ingenieur, by H. Buschmann.

SOME REMARKS ON THE HYDRAULICS OF STEADY-STATE WELLS IN UNCONFINED MEDIA, by D. F. Peterson, Jr. Colorado. Agricultural and Mechanical College, Fort Collins, Colo. Mar 1951. 14p diagrs, graphs Available from Civil Engineering Dept., Colorado A & M College, Fort Collins, Colo. PB 104254

1. Wells, Gravity 2. Hydraulic engineering.

SPARK ARRESTERS FOR EXHAUST PIPES ON GASOLINE AND DIESEL ENGINES, by Henry F. Gauss. Idaho. Engineering Experiment Station, Moscow, Idaho. Dec 1949. 50p photos, drawings, tables Available from University of Idaho, Engineering Experiment Station, Moscow, Idaho. PB 104610

1. Engines, Diesel - Exhaust 2. Engines, Gasoline - Exhaust 3. Spark arresters 4. Exhaust - Explosion prevention 5. ID EES B6.

STRUTTURA DELLA FUNZIONE DI AIRY NEI SISTEMI MOLTEPLICEMENTE CONNESSI. (STRUCTURE OF AIRY'S STRESS FUNCTION IN MULTIPLY CONNECTED REGIONS), by Giusippe Grioli. Jul 1951. 34p Mi $2.25, Ph $5.00. PB 104600

In solving two-dimensional problems using Airy's stress function for multiply connected regions, the form of the function depends on the dislocations and boundary forces present. The structure of Airy's function is shown to consist of a part expressible in terms of boundary forces and a part expressible in the manner of Poincare. Meanings of the constants occurring in Poincare's expression are discussed. Translation from Giornale di Matematiche, Vol. 77, 1947. p. 119-144. NACA TM 1290.

TESTING AND RATING PROPELLER FANS, by W. D. Scoates and Arthur W. Melloh. Texas. Engineering Experiment Station, College Station, Texas. Apr 1950. 13p photos, drawings Available from Texas Engineering Experiment Station, College Station, Tex PB 103676

1. Fans, Electric - Tests 2. Blowers, Cooling - Tests 3. National Association of Fan Manufacturers. Engineering Committee 4. American Society of Heating and Ventilating Engineers. Fan Test Code Committee 5. National Electrical Manufacturers Association 6. NEMA Code (National Electrical Manufacturers Association) 7. NAFM Code (National Association of Fan Manufacturers) 8. ASHVE Code (American Society of Heating and Ventilating Engineers 9. TU EES RR 12.

THEMEN-HEFT FÜR S. W. (TR.) TRUPPEN-SPEZIALISTENLEHRGANG BEI DER ZW./4 E.M. A.A. CUXHAVEN-DUNNEN VON 4.8.-6.9. 1941 (OUTLINE FOR A COURSE OF LECTURES TO SPECIALIST TROOPS AT CUXHAVEN FROM AUG. 4 TO SEP. 6, 1941 ON OPERATION OF BOSCH INTERNAL-COMBUSTION ENGINE PRESUMABLY USED AS PORTABLE POWER PLANT FOR SEARCHLIGHT), by Werner Reinecke. Jun 1941. 93f drawings, diagrs, graphs (Text in German) Mi $4.25, Enl Pr $13.75. PB 103835

1. Power plants, Searchlight - Germany 2. Power plants, Searchlight - Parts - Germany 3. Engines, Internal combustion - Operation - Germany 4. Solex (Engine) 5. G150 K (Searchlight) 6. Micro NAVSHIPS 0-3234-46.

THEORETISCHE UNTERSUCHUNG DES SCHMIERDRUCKES ZWISCHEN WALZEN BEI KONSTANTER UND BEI DRUCKABHÄNGIGER ZÄHIGKEIT. TEIL IV: VERFORMUNG DES RANDES EINER HALBEBENE DURCH EINE NORMALBELASTUNG. TEIL V: BESTIMMUNG DES SCHMIERFILMES FÜR KONSTANTE ZÄHIGKEIT BEI VERFORMUNG DER WALZEN (THEORETICAL INVESTIGATION OF OIL PRESSURE BETWEEN ROLLERS AT CONSTANT AND PRESSURE-DEPENDENT VISCOSITY. PART IV: DEFORMATION OF THE BOUNDARY OF A SEMI-PLANE BY NORMAL LOADING. PART V: DETERMINATION OF THE OIL FILM FOR CONSTANT VISCOSITY, WHEN THE ROLLERS ARE DEFORMED), by C. Weber. Aug 1949. 29p graphs (1 fold), tables (1 fold) Mi $2.00, Ph $3.75. PB 104684

1. Oil pressure - Germany 2. Lubricants - Viscosity - Germany 3. Roller bearings - Deformation - Germany 4. Roller bearings - Research - Germany 5. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 6. DSIR SR 10,

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 116.

WALZENPRÜFSTAND MIT VERÄNDLICHEM SCHLUPF: BEGRÜNDUNG FÜR DEN BAU UND KURZE BESCHREIBUNG DESSELBEN (BRIEF DESCRIPTION OF A DESIGN FOR A DISC TESTER WITH VARIABLE SLIP), by K. W. Kraupner. Oct 1950. 14p fold drawing, diagrs Mi $1.75, Ph $2.50. PB 104689

1. Machines, Testing - Germany 2. Roller bearings - Testing equipment - Germany 3. Gears, Roller - Testing equipment - Germany 4. Braunschweig. Technische Hochschule. Institut für Maschinenelemente 5. DSIR SR 18.

Translation of Institut für Maschinenelemente, Technische Hochschule, Braunschweig. Einzelbericht nr. 131.

MEDICAL RESEARCH AND PRACTICE

EFFECT OF NOISE-INDUCED TEMPORARY DEAFNESS UPON VOCAL INTENSITY, by John W. Black. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla. Jan 1951. 9p graph Mi $1.25, Ph $1.25. PB 104637

Twenty-four groups of males, six members per group, read phrases before and after 120 minutes exposure to simulated cock-pit noise. At the time of the reading a threshold measurement was secured of the readers' auditory acuity at 512 c.p.s. The exposure to noise reduced the mean hearing values nine decibels and increased the vocal intensity half of this amount. The recovery in neither instance was complete after 15 minutes of silence. The trends of recovery, in so far as they progressed, were linear in both sets of measures. Vocal intensity is apparently not solely a function of the intensity of the airborne side-tone. Joint project report no. 7, Ohio State University Research Foundation, Columbus, Ohio under Contract N6 onr 22525, project designation NR142-992, and U. S. Naval School of Aviation Medicine, Bureau of Medicine and Surgery project NM001064.01.17.

EXTENT OF PATHOLOGICAL DAMAGE TO ANIMALS EXPLOSIVELY DECOMPRESSED IN A COLD ENVIRONMENT, by William L. Burkhardt, Robert E. Hedblom, A. W. Hetherington, H. F. Adler. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1951. 5p tables Mi $1.25, Ph $1.25. PB 104531

Under the conditions of the aircraft study on guinea pigs that were rapidly decompressed in both a warm and a cold environment, no pathological differences were noted at autopsy nor was there significant biochemical difference in lung hemorrhage. Under the conditions of the low pressure chamber experiment on dogs decompressed rapidly and slowly in both a warm and a cold environment, no augmentation of pulmonary damage due to explosive decompression was brought about by the additional stress of chilling the animal and carrying out the experiment in a cold environment. Reprinted from Journal of Aviation Medicine, Aug 1950, p. 304-308. AAF SAM Project 21-23-002.

INVESTIGATIONS ON THE USEFULNESS OF CONTACT LENSES IN FLIGHT: I: SENSIBILITY OF CORNEA AND CONJUNCTIVA OF THE HUMAN EYE, by Hubertus Strughold. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1951. 8p photos, diagrs, tables Mi $1.25, Ph $1.25. PB 104588

Analysis is made of the sensations and their topographical distribution on the cornea and conjunctiva of the human eye as a basis for the construction and use of contact lenses. The cornea and conjunctiva bulbi respond to mechanical stimuli with pain sensation only. The pressure sense is not represented in these areas. The center of the cornea is the most pain-sensitive spot of the whole body. The border of the cornea is 10 times, and the corneal border of the conjunctiva bulbi is about 150 times, less sensitive than the center of the cornea. This zonal difference in the sensitivity to mechanical stimuli is of significance in the problem of fitting contact lenses. The topography of the temperature sense on the cornea and conjunctiva is reviewed. AAF SAM Proj. 21-24-006, Report no. 1.

PATHOGENESIS OF MUSCLE NECROSIS DUE TO EXPERIMENTAL COLD INJURY, by R. B. Lewis. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1951. 9p photos Mi $1.25, Ph $1.25. PB 104529

Microscopic signs of degeneration of the muscle cells were observed as early as 15 minutes after frostbite and were characterized by vacuolation, fenestration, and actual disintegration of segments of muscle fibers. At times, only a fine honeycombed eosinophilic structure represented the involved portions of the muscle cells. The pathologic process progressed gradually to complete necrosis, not only of the muscle but of connective tissue as well, and was grossly visible after 3 days. Acute exudation was demonstrable in 4 to 6 hours; fibroblastic proliferation began at the margins of the necrotic zone in 24 hours and was marked after 8 days. Vascular thrombosis was not seen earlier than 24 hours, was fairly often observed after 48 hours, and was more frequently found thereafter. AAF SAM Project 21-23-006, Report no. 10.

PHYSICS OF VIBRATIONS IN LIVING TISSUES, by Ernst K. Franke, Henning E. von Gierke, Hans L. Oestreicher, Horace O. Parrack, Wolf W. von Wittern. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1951. 33p photo, graphs Mi $2.25, Ph $5.00. PB 104672

The experimental data about the behavior of vibrating body tissue for the frequency range zero to 20 Kcps are summarized. The results show that the vibratory energy is absorbed by the body surface in several ways and that for the distribution of the energy inside the body tissue in the different frequency ranges different types of wave propagation are important. The results suggested a theory where the propagation of vibratory energy in soft human body tissue is compared to the wave propagation in a viscous elastic compressible medium. The general physical conclusions of this theory are briefly outlined and the three types of wave propagation to be expected, the shear waves, the compression waves and the surface waves are characterized. By applying this theory specifically to the cases experimentally investigated where the vibrating force is applied perpendiculary to the body surface it is shown that the simplified model of a vibrating sphere in a viscous elastic medium describes entirely the mechanical behavior of the body tissue. The qualitative agreement between the calculated and measured characteristics in terms of impedances was found to be sufficiently good, that it is possible to determine out of this agreement approximate values for the shear elasticity and the viscosity of the body tissue, the most important of the unknown physical constants involved in the theory. With these constants known the mechanical behavior of the body surface can be calculated for the whole frequency range from zero to about 10^5 cps in the ultrasound range. The theory enables us also to estimate from

the impedance characteristic measured on the body surface, the kind of wave propagation inside the body. That is, it shows how much of the total energy entering the body is distributed in the body in the form of shear waves and how much as compression waves. AAF TR 6367.

RAPID LABORATORY DIAGNOSTIC PROCEDURES IN MICROBIOLOGY. I: ANTIBIOTIC SENSITIVITY DETERMINATIONS FOR PSEUDOMONAS AERUGINOSA ISOLATED FROM EXTERNAL OTITIS, by Roland B. Mitchell, Anna C. Arnold, and James E. Lett. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Apr 1951. 7p photos Mi $1.25, Ph $1.25. PB 104528

A procedure is described for the rapid determination of the sulfamylon and antibiotic sensitivity of Pseudomonas aeruginosa and other microorganisms present in specimens submitted for bacteriologic analyses. The author discusses the comparative sensitivity reactions to seven chemotherapeutic agents of 54 cultures of Ps. aeruginosa isolated from frank cases of otitis externa. Stop-motion photography of these comparative tests revealed that 6 to 8 hours is sufficient elapsed time for determining the sensitivity reactions of Ps. aeruginosa organisms. AAF SAM Project 21-35-006, Report no. 1.

TEMPERATURE GRADIENT COLORIMETRY, by A. C. Young, H. L. Burns, W. F. Quinton, L.D. Carlson. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1951. 17p photos, diagrs Mi $1.75, Ph $2.50. PB 104116

The equipment described is part of that used in field tests at northern latitudes in an investigation of possible physiological changes occurring during acclimatization. Special suits, designed to measure heat loss, consists of an inner layer, a core layer and an outer layer of insulating material. Grids of nickel wire are fastened on either side of the core layer. Resistance changes in the grids indicate the temperature drop across the core layer and from this the heat loss may be calculated. The 18 separate grids in the suit enable distinction between heat loss from the head; the back; right or left side; hands; feet; and the sole of the foot. Heat loss from each region and the total heat loss have been recorded. Similarly, skin temperature is measured by copper-constantan thermocouples at thirty-four points on the body. This report is one of three to be presented by the University of Washington, Seattle, Wash. on Contract no. AF33 (038)-422 on work conducted at Ladd Field, Alaska, during the winter 1949-1950. See also PB 104115.

UPSTAKE AND EFFECT OF RADIOPHOSPHORUS IN MOSQUITOES, by Charles C. Hassett and Dale W. Jenkins. U. S. Chemical Corps. Medical Division, Army Chemical Center, Md. May 1951. 22p graphs, tables Mi $2.00, Ph $3.75. PB 104543

To determine the factors concerned in the uptake, accumulation, and effect of radiophosphorus in mosquitoes for use in flight range studies and to determine the optimum method for rearing. CMLEM-52. CC MD RR 58.

VISUAL ACUITY AT SCOTOPIC LEVELS OF ILLUMINATION, by Ailene Morris and Forrest L. Dimmick. U. S. Navy. Medical Research Laboratory, Naval Submarine Base, New London, Conn. Dec 1950. 25p photos, graphs, tables Mi $2.00, Ph $3.75. PB 104624

Measurements of visual acuity have been made at light levels that cover the range of scotopic vision. A checkerboard-type target was used in which each side of the checkerboard area subtended a visual angle of 9°. Its center lay 10° from the fixation point. Individual checkers ranged in angular subtense from 8 minutes to 3 degrees. Targets were presented in four positions, that is, with the checkerboard area up, down, right and left. By the psycho-physical method of constant stimuli, acuity thresholds were obtained for six observers at eight light levels between 3.7 log μμL and 6.7 log μμL. The 50% limens plotted in units of reciprocal visual angle against log brightness showed acuity increasing in a straight line function whose average equation is V = .033 log B - .09. At the scotopic level brightness difference is the principal factor. Measurements with an infra-red pupillometer showed that pupil size changed with light level in this range and was correlated with individual differences in acuity. Six log μμL has been confirmed as the upper limit of brightness for which scotopic acuity is uncontaminated by photopic factors. Bu Med Project NM003041.04 Report no. 3. MRL Report no. 162, v. 9, 1950, p. 157-183. NAV MRL 162.

VISUAL MEASUREMENTS OF ATMOSPHERIC TRANSMISSION OF LIGHT AT NIGHT, by C. A. Pearson, M. J. Koomen, and R. Tousey. U. S. Naval Research Laboratory. Feb 1951. 18p photo, diagrs, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.50. PB 103914

Measurements of the visual transmission of the atmosphere were made at night across Chesapeake Bay over a period of two years. A visual telephotometer was used to measure the illumination produced at a distance of 8.77 sea miles by a series of calibrated light sources. Transmission values ranging between 0.4 and 0.9 per sea mile could be measured to an accuracy of ±2 percent with the equipment as installed. Lower values were outside the range of the equipment and higher values are not normal for transmission through air. Under stable atmospheric conditions the data obtained at night were in good agreement with direct observations of the daylight visual range made before sunset and after the following dawn. NRL R 3810.

METALS AND METAL PRODUCTS

ALLOY STEEL CONSERVATION - NATIONAL EMERGENCY AND BORON STEELS. U. S. Office of Technical Services. Sep 1951. 6p tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.10. PB 104922

1. Steel - Conservation 2. Steel alloys - Conservation 3. Steel, Boron - Conservation 4. OTS IR 7052.

ALUMINUM ALLOYS DESCRIPTIVE PAMPHLETS. Leipziger Leichtmetallwerk Rackwitz K. G., Rackwitz, Ger. 1937-1944. 137f photos, diagrs, graphs (Text in German) Mi $5.50, Enl Pr $18.75. PB 104355

1. Aluminum alloys - Germany 2. Aluminum-silicon-iron alloys - Germany 3. Aluminum-magnesium

alloys - Strength - Germany 4. Aluminum-magnesium alloys - Machinability - Germany 5. Aluminum-magnesium alloys - Heat treatment - Germany 6. Aluminum-magnesium alloys - Corrosion fatigue - Germany 7. Aluminum-magnesium-alloys - Tensile properties - Germany 8. Aluminum-magnesium-zinc alloys - Corrosion - Germany 9. Aluminum-magnesium-zinc alloys - Recrystallization - Germany 10. Aluminum-magnesium -zinc alloys - Heat treatment, Effect of - Germany 11. Aluminum-copper-magnesium alloys - Annealing time - Germany 12. Bauxite - X-ray tests - Germany 13. Durokawimeter (Trade name) 14. Light metals - Welding, Spot - Germany 15. Light metals - Welding, Resistance - Germany 16. Light metals - Welds - Structure - Germany 17. Magnesium castings - Germany 18. Machines, Testing - Magnet-inductive - Germany 19. Sheet metal - Drawing - Germany 20. Welding equipment - Germany 21. Micro BIOS FD 677/46, Frames unnumbered.

Articles reprinted from various periodicals. English abstract included. Abstract available as PB 104355s. 3p. Mi $1.25, Ph $1.25. Contents: I. Ueber das system aluminium-eisen-silizium (Aluminum-iron-silicium system) by Walter Jaeniche. From Aluminium archiv, v. 5,- II. Leichtmetall-automatenlegierungen auf. aluminium-magnesium basis (Machining light metal alloys of aluminium-magnesium base) by Hans Bohner. From Aluminium, Mar 1937. - III. Ueber das punktschweissen von leicht metallen mit mitell frequenz (Spot-welding of light metals of medium frequency) by H. Maeder and G. Hagedorn. From Elektroschweissung, 1943. - IV. Die mitellfrequenz-schweissmaschine und ihr einsatz beim punktschweissen der leichtmettalen (Medium frequency welding machine and its use in the spot welding of light metals) by H. Maeder. From Werkstatt und Betrieb 1943. - V. Festigkeitssigenschaften und wärmebehandlung von walzhalbzeugen aus Al-Mglegierungen (Strength and heat treatment of rolled semi-finished products from aluminum-magnesium alloys) by W. Lott. From Metallwirtschaft 1944. - VI. Festigkeitseigenschaften von Al-Mg legierungen bei der temperature des flüssigen sauerstoffs (Strength of aluminum-magnesium alloys at the temperature of liquid oxygen) by H. Maeder. From Zeitschrift für die gesamte kälte industrie, 1942. - VII. Ueber das widerstandschweissen der leichtmetalle (Resistance welding of light metals) by H. Maeder. From Technieche blaetter, 1942. - VIII. Ueber eine neue bei leichtmetallschweissungen beobachtete fehlererscheinung und ihre vermeidung (A new defect observed in light metal weldings and its avoidance) by H. Maeder. From Aluminum, 1944. - IX. Beitrag zur frage der spannungskorrosion von aluminum-magnesium legierungen (Contribution to the question of the strain corrosion of aluminum-magnesium alloys) by P. Menzen. From Metallwirtschaft, 1942. X. Roentgenographische unterschungen über die thermischen umwandlungen von diasper-und boehmithaltigen bauxiten (Roentgenographical research concerning the thermic transformations of bauxites containing diaspore and boehmit) by M. Staesche and J. Wetzel. From Metall und erz, 1944. - XI. Erprobung des magnet-induktiven prüfgerätes "Durokawimeter" (Trial of the magnet-inductive testing apparatus "Durokawimeter") by H. Maeder. From Aluminum, 1944. XII. Grundlagen des leichtbaues, und erfahrungen bei seiner durchführung (Fundamentals of light metal construction, and experiences during the process) by Walter Meinel-Tannenberg. From Das Industrieblatt, 1942. - XIII. Schnellbestimmung des magnesiumgehaltes von aluminium-magnesium-legierungen auf roentgenographischem wege (Rapid analysis of the magnesium content of aluminium-magnesium alloys by means of roentgenography) by Herbert Kuestner. From Zeitschrift für metallkunde, 1942. - XIV. Ueber die streckziehfaehigkeit der Al-Mglegierungen (Tensile strength of aluminum-magnesium alloys) by W. Patterson. From Metallwirtschaft, 1942. - XV. Das tiefziehverhalten von leichtmetallblech (Deep drawing behavior of light metal sheeting) by H. Hornauer. From Werkstattstechnik/Der Betrieb, 1943. - XVI. Ueber magnesiumblockguss unter besonderer berücksichtigung eines neven stranggiessverfahrens mit unmittelbarer flüssigkeitskühlung (Casting of magnesium ingots, with special reference to a new process of "Stranggiess" (Extension casting?) with immediate cooling-off by a liquid) by Paul Menzen and Wilheim Patterson. From Aluminium, 1943. - XVII. Zur frage der gluehdauer bei lösungsgluehung von Al-Cu-Mg walzerzeugnissen (Annealing time in the solvent annealing of Al-Cu-Mg products) by Werner Lott. From Aluminium, 1943. - XVIII. Blockguss von magnesium-legierungen (Casting of ingots from magnesium alloys) by W. Patterson. From Rundschau Deutscher Technik, 1944. - XIX. Ueber das widerstandschweissen der leichtmetalle (Resistance welding of light metals) by H. Maeder. From Deutsche-Motor-Zeitschrift, 1942. - XX. Ueber die schweissrissigkeit von leichtmetallen (Cracking tendency of welded light metals) by H. Maeder . From Aluminium, 1944. - XXI. Gestaltungsfragen bei der schweisstechnischen verarbeitung der leichtmetalle (Questions of structure in the welding process of light metals), by H. Maeder. From Werkstatt und betrieb, 1942. - XXII. Ueber neue zinkhaltige aluminium-knetlegierungen (New zinc-containing aluminium plastic alloys) by P. Menzen and W. Patterson. From Metallwirtschaft, 1944. - XXIII. Metallkundliche vorausseltzungen zur herstellung korrosionsbeständiger hochfester bleche aus Al-Zn-Mg-legierungen (Metallurgical hypotheses for the production of corrosion-resisting high-strength sheet from Al-Zn-Mg alloys) by W. Patterson. From Metallwirtschaft, 1944.

ARGON ARC WELDING OF COMMERCIALLY PURE TITANIUM AND A TITANIUM ALLOY, by Paul S. Methe. Jan 1950. 88p photos, diagrs, graphs, tables Mi $3.75, Ph $11.25. PB 104508

Commercially pure titanium and an experimental titanium alloy were welded with argon arc, using argon gas and copper metal type of backings. The effects of the welding operation and subsequent heat treatment were determined from the results of notched bend, tensile, hardness traverse, and corrosion tests, and by metallographic examination. The ductility of the Remington Arms titanium was reduced by welding and was not increased by heat treatment. The strength was greater than the as-received sheet. The ductility of the Allegheny Ludlum titanium indicated a close approach to the as-received sheet, and the strength values for the two types of sheet were equal. The strength and ductility of the experimental alloy were decreased by welding, but were increased by heat treatment. The corrosion resistance of the pure titanium and titanium alloy was not reduced by welding. Thesis-Rensselaer Polytechnic Institute.

CONTRACT FOR SERVICES, FACILITIES AND MATERIALS REQUIRED TO INVESTIGATE AND STUDY MAGNETIC FERRITES. FIFTH QUARTERLY PROGRESS REPORT, APR. 1, 1950-JUNE 30, 1950 UNDER CONTRACT W36-039-SC-38239, by E. Albers-Schoenberg and Harold A. Goldsmith. General Ceramics and Steatite Corp., Keasbey, N. J. Jan 1950. 31p graphs Mi $2.25, Ph $5.00. PB 104566

Progress is outlined of the development and study of ferromagnetic ferrites of different permeabilities and low magnetic losses. Refiring a ferrite in nitrogen atmosphere was found to cause an increase in initial and maximum permeability. Maximum permeability and saturation flux density were found to decrease with temperature for a B-body. While initial permeability increases toward the curie point, saturation flux density and maximum permeability decrease toward the curie point for G-body. Some ferrites exhibit an increase in maximum permeability under compression while others show a decrease, indicating magnetostriction of opposite signs for these bodies. The effect of air gap on the temperature coefficient of effective permeability for various ferrites is predicted in a graphical form. Preparation of ferrite bodies is described. Dept. of the Army project: 3-93-00-500. Signal Corps project: 32-2005-32.

DELAYED FRACTURE OF SINTERED ALUMINA, by S. Pearson. Gt. Brit. Royal Aircraft Establishment, Farnborough, England. Apr 1950. 7p graph Mi $1.25, Ph $1.25. PB 104569

Delayed fracture experiments made on sintered alumina, as representing a brittle polycrystalline material with a very good resistance to chemical attack when stress-free, are described. The strength of sintered alumina, when tested in the normal atmosphere, is shown to depend on the time for which the stress is applied. When stressed in bending under constant load, the average time to fracture increases from 1 sec to 106 sec when the stress is reduced in the ratio 1.3.1. The delayed fracture can be largely eliminated by heat treating and testing in a vacuum. The vacuum heat treatment does not change the strength of the material permanently since the delayed fracture effect reappears when the material is again exposed to the atmosphere. It was concluded that the effect is very largely due to attack of the stressed material by constituents of the atmosphere. Report no. Met. 51. R.A.E. Ref: Mat. M8/10102/SP/140.

DIMENSIONAL CHANGES IN NICKEL ZINC FERRITE IN THE NEIGHBORHOOD OF THE CURIE TEMPERATURE, by R. C. Deshpande. Jan 1950. 64p photos, diagrs, graphs, tables Mi $3.00, Ph $8.75. PB 104507

An investigation was made of the dimensional changes of nickel zinc ferrite in the region of the Curie temperature and to determine if any crystal-structure change is present at the Curie point. Specimens were prepared using 15 atomic percent NiO, 35 atomic percent ZnO, and 50 atomic percent Fe_2O_3. The back reflection x-ray diffraction patterns of the specimens were obtained at different temperatures below and above the Curie point with iron radiation, and in one instance, chromium radiation. A specimen containing 25% silver powder incorporated with 75% of the ferrite sample powder was also prepared. From the study of lattice dimension vs temperature, it was found that there is no crystal-structure change at the Curie point, but there is an abnormal expansion behavior up to the Curie point, and above the Curie point a contraction of the lattice is observed. Thesis-Rensselaer Polytechnic Institute.

EFFECTS OF DESIGN DETAILS ON THE FATIGUE STRENGTH OF 355-T6 SAND-CAST ALUMINUM ALLOY, by M. Holt and I. D. Eaton. U. S. National Advisory Committee for Aeronautics. Jul 1951. 33p photos, drawings, graphs, tables Mi $2.25, Ph $5.00. PB 104534

Data are given on results of static and fatigue tests of 355-T6 sand-cast plate-type aluminum-alloy specimens incorporating holes, bosses, and ribs. NACA TN 2394.

EXPERIMENTAL MAGNESIUM ALLOYS CONTAINING ZIRCONIUM, by Edward Horne and Mabel Strader. U. S. Air Materiel Command. Engineering Division. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1946. 6p tables Mi $1.25, Ph $1.25. PB 104711

1. Magnesium alloys - Tensile tests 2. Magnesium alloys - Compression tests 3. Magnesium-zinc-zirconium alloys 4. Magnesium-silver-zinc-zirconium alloys 5. AAF TSEAM MR M4491, Add. III.

FABRICATION OF HIGH-MELTING-POINT ALLOYS BY SPRAYING AND SINTERING, by James E. Cline, Robert T. Thurston, and John Wulff. Massachusetts Institute of Technology, Cambridge, Mass. Nov 1949. 23p photos, drawing, diagr, graphs, tables Mi $2.00, Ph $3.75. PB 104555

A method is outlined for determining the heat content and temperature of sprayed metal particles at the moment of impact. Tests were made with zinc, aluminum, copper, nickel, iron and molybdenum. The results indicate that sprayed particles of low- and high-melting-point metals are at their melting points at impingement. The results of an investigation of the metal spraying of high-temperature metals and alloys are given. A hydrostatic bursting technique was developed for measuring the strength of sprayed deposits. With this technique a relationship was shown to exist between the oxide content and the strength of sprayed metal. Sintering of sprayed metal deposits in hydrogen, especially in the presence of a liquid phase, was successfully accomplished, resulting in notable increases in density and in bursting strength. Guided Missiles Program. Meteor report no. 45. Contract NOrd 9661.

FLASH WELDING OF HIGH-TENSILE STEELS. SECOND PROGRESS REPORT, by H. Brooks and P. Gregory. Gt. Brit. Royal Aircraft Establishment, Farnborough, England. Apr 1950. 21p photos, diagr, tables Mi $2.00, Ph $3.75. PB 104571

Progress is reported on the flash welding of high tensile steels with respect to measurements of energy input during the flash welding of 3 in. OD x 6 S.W.G. tubes, and on an experiment with flash welded joints in 1-1/2 in. OD x 6 S.W.G. tubing on which the variables were flashing and upset distances, flashing speed and secondary voltage. Energy input was found to depend mainly on the flashing distance in an approx linear manner. Results of the experiment, having the above mentioned variables, show that a high secondary voltage often gives better joint strengths than a low voltage value. Important effects of flashing speed and distance on weld quality were confirmed, and metallographic features of flash

welded high and low strength joints were examined. Tests on joints of the tubing indicate that the fatigue strength of these flash welded joints would be adequate for airframe applications. Technical note no. Met. 122. R.A.E. Ref: M5/8387/HB/171.

HIGH STRENGTH ALUMINUM CASTING ALLOY. FINAL REPORT UNDER CONTRACT NOA(S)-10575, by E. H. Kinelski. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. May 1950. 19p photo, graphs, tables Mi $1.75, Ph $2.50. PB 104519

Experiments were initiated with Heat 34, a very promising high-strength Al-Zn-Mg-Si alloy, in an attempt to develop a high-strength aluminum casting alloy. A casting technique was developed for inductively melting and pouring permanent-mold tensile test bars, and variations in the composition of Heat 34 were tested. The exclusion of zinc from this alloy system resulted in a stronger alloy than when zinc was included in the heat-treated condition. Compression yield strength and shear strength values were determined for the best Heat 34 composition. CAL KA-662-M-4.

INFLUENCE OF STRAIN RATE ON HIGH TEMPERATURE TENSILE PROPERTIES OF SHEET MATERIAL, by Glen J. Guarnieri and James Miller. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Jan 1948. 19p photos, graphs Mi $1.75, Ph $2.50. PB 104568

The magnitude of the strain-rate influence on the high-temperature tensile properties of three heat-resistant sheet materials of current interest, namely, 25-20-2 Silicon stainless steel, regular Inconel, and S-816 was determined. It was shown that a 50% change in tensile strength could be induced in these alloys by a tenfold change in strain rate. Further analysis of the data on temperature, stress, strain, and time, indicates that some insight into the high-temperature deformation mechanism can be obtained, particularly if consideration is given to measurement of the activation energies involved. This viewpoint was used to explain the time or strain-rate effect on the elastic limit at high temperature. Contract no. N6ori-119. Project Squid. Technical memorandum no. CAL-11. CAL DD-420-A-11.

INVESTIGATION OF THE CORROSION RESISTANCE OF TITANIUM AND TITANIUM ALLOYS, by J. H. James. U. S. Naval Air Material Center. Aeronautical Materials Laboratory, Philadelphia, Pa. Feb 1950. 24p photos, diagr, graphs Mi $2.00, Ph $3.75. PB 104514

Solution potentials of titanium and surface treated titanium, over a 24-hour immersion period, were measured. Dissimilar metal couple tests were conducted in NaCl solution. Dissimilar metal couples of titanium with zinc, zinc-anozinc treated, cadmium and cadmium-tin alloy plated steel were subjected, each, to salt spray, humidity and atmospheric exposures. The adhesion of paint to anodized and unanodized titanium was compared. Results indicate that titanium is cathodic to most metals used in aircraft construction. The corrosion rates of dissimilar metals connected to titanium were similar to the corrosion rates of the same metals connected type 321 18-8 stainless steel. Contacts of titanium on type 321 18-8 stainless steel did not accelerate the corrosion of plated metals such as zinc, zinc-anozinc treated, cadmium or cadmium-tin alloy when subjected to exposure tests. NAM AML 411033 pt. 1.

INVESTIGATION OF THE EFFECT OF NITRIDING ON THE CORROSION RESISTANCE OF STAINLESS STEELS AND NITRALLOY, by Patrick S. Bennett. Jan 1950. 37p photos, table Mi $2.25, Ph $5.00. PB 104512

The effect of nitriding on the corrosion resistance of stainless steels and nitralloy is investigated. The work entails the actual nitriding of six different types of steels, obtaining the hardness value and the depth of case of each nitrided specimen, submitting the nitrided samples to various corrosive reagents, and analyzing the results of these tests. The experiments performed and described in this paper show that the corrosion resistance of nitrided stainless steel was decreased by nitriding, but that the rate of corrosion in many cases was still less than that of nitrided nitralloy. In the practice, the conditions to which the steel will be subjected decide which steel to use for corrosion resistance, and suggestions are made on how to evaluate these conditions properly. Thesis-Rensselaer Polytechnic Institute.

INVESTIGATION OF THE FUNDAMENTAL FACTORS PROMOTING HIGH-TEMPERATURE STRENGTH OF ALLOYS. SUMMARY REPORT, CONTRACT N5-ORI-111, by C. C. McBride, A. R. Elsea and G. K. Manning. Battelle Memorial Institute, Columbus, Ohio. Sep 1949. 58p diagr, graphs, tables Mi $2.75, Ph $7.50. PB 104552

An investigation has been made of the fundamental factors promoting high-temperature strength of alloys. The effects of nitrogen, iron, and nickel additions upon the alpha-beta transformation and the precipitation of gamma in cobalt-chromium alloys (20 - 32% chromium) were studied. Data were obtained from metallographic examination of heat-treated specimens which indicate that each of these elements lowers the alpha-beta transformation temperature range and promotes the formation of a gamma phase, which appears to be similar to the compound in the binary cobalt-chromium system. Project NR031-003.

INVESTIGATION OF THE GERMAN BDS CHROMIZING PROCESS, by C. A. Naugle. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. May 1948. 38p photos, drawings, graphs, tables Mi $2.25, Ph $5.00. PB 104709

A description of the German chromizing process which was developed to conserve strategic materials is presented. The principle of chromizing involves the use of chromous chloride and an approximate temperature of 1900°F. An atom exchange between iron and chromium is effected by chromium's being diffused into the surface of the steel part being treated, while the iron is given up by the steel in the form of ferrous chloride. Since properties of chromized parts are highly resistant at high temperatures to corrosion and erosion, attention is invited to its commercial possibilities, and to the need of further research in order to develop a process which would be more nearly commensurate with the American system of production. Project FQ-191. Dr. Rolf M. Ammann and Dr. Heinrich Otto Adenstedt assisted on this project. AAF TR 1183.

LOW TEMPERATURE TRANSFORMATIONS IN LITHIUM-MAGNESIUM-ALUMINUM AND LITHIUM-MAGNESIUM-ZINC ALLOYS, by K. Sham Prasad. Jan 1950. 54p photos, diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 104509

Lithium-magnesium-aluminum and lithium-magnesium-zinc alloys were prepared and gradually cooled in air. Phase transformations occur in the Li-Mg-Al alloys, provided the proportion of the aluminum does not exceed about 2.85 atomic percent. An amount equal to or greater than this quantity practically stops the transformation. The explanation for this behavior is found in the free energy theory. For the Li-Ag-Al alloys no definite conclusions could be stated, owing to the fact that the " δ " phase appears even at low weight percentages of zinc. Thesis-Rensselaer Polytechnic Institute.

MAGNESIUM ALLOY RESEARCH: TERNARY MAGNESIUM-LITHIUM BASE CONSTITUTION DIAGRAMS, MAGNESIUM ALLOYS OF LOW ALLOYS ADDITIONS, PREPARATION OF SINGLE CRYSTALS OF MAGNESIUM ALLOYS, by A. Jones, R. R. Nash, R. G. Brown, W. P. James. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1950. 198p photos, diagrs, graphs, tables Mi $7.00, Ph $25.00. PB 104564

Experimental work in Mg alloy research is summarized. First, methods are established and equipment is constructed for a phase-boundary study of high-purity Mg-Li ternary alloys with Al, Zn, D, and Ce added as the third component. The second part of the report concerns the development of new medium-strength and high-formability Mg-base alloys with a total alloy addition of 1% or less. The most promising results were obtained from an alloy containing 0.8% Zn, 0.2% Ce, and the balance Mg. Warm rolling for one hour at 600°F produced optinum mechanical properties. The third part of the report describes the development of a method, based on the Bridgman technique, for the preparation of single crystals of Mg and Mg-solid-solution alloys. The crystal mold and the furnace remain stationary, while the temperature gradient is moved to control the solidification. Prepared by Rensselaer Polytechnic Institute under Contract no. W33-038-ac-22542. AAF TR 6174.

MAGNESIUM ALLOYS CONTAINING ZIRCONIUM, by G. W. Orton. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1950. 6p Mi $1.25, Ph $1.25. PB 104559

An investigation was made of the preparation and properties of magnesium-zirconium base alloys and of methods of introducing zirconium into the magnesium. The best method of introducing zirconium into magnesium alloys is through the use of zirconium salts, particularly zirconium chlorides, either a dense zirconium chloride or a mixture of 50% zirconium chloride, 25% potassium chloride. The salt must be thoroughly dried before it is introduced into the magnesium. Magnesium-zinc-zirconium alloy possess mechanical properties which are appreciably better than those commercially available today. Magnesium-zirconium alloys containing zinc have compounds capable of precipitation, which takes place so slowly that during solidification the alloys remain oversaturated. Therefore, only aging is needed to improve their mechanical properties. AAF TR 6173.

MAGNITNOI STRUKTURE VYSOKOKOZRTSITIVNYKH SPLAVOV (MAGNETIC STRUCTURE OF HIGHLY COERCIVE ALLOYS), by L. A. Shubina and Ya.S. Shur. Jan 1949. 8p graphs (Text in Russian) Mi $1.25, Ph $1.25. PB 104517

The characteristics of the magnetic structure of highly coercive alloys were analyzed. It was assumed that the ferromagnetic phase has the form of thin lamella separated by nonferromagnetic interlayers whereby the boundaries of one lamina include only one region of spontaneous magnetization, Since there is no nuclear magnetic reversal in the domains it excludes the processes of boundary displacement and all phenomena of magnetization can be realized only through the process of rotation. Reprinted from Zhurnal tekhnicheskoi fiziki t. 19, p. 88-94.

MECHANICAL PROPERTIES OF BAINITIC AND MARTENSITIC STEELS. FIRST QUARTERLY REPORT ON CONTRACT AF33(038)-10218 (E.O. NO. 46036), by R. F. Mehl and others. Carnegie Institute of Technology, Pittsburgh, Pa. May 1950. 39p photos, graphs, tables Mi $2.25, Ph $5.00. PB 104563

This first quarterly progress report outlines the study made of the mechanical properties of bainitic and martensitic steels. A survey of literature was also made regarding the effect of bainite on mechanical properties and the mechanism of bainite formation. Tensile properties of a low alloy (0.32% C) steel in the quenched and tempered condition were compared with those of the same steel heat-treated to a structure of about 10% bainite and 90% martensite tempered to the same hardness. Methods for determining the percentage of bainite in microstructures were investigated and a description is given of a new photometric procedure which will permit such measurements to be made efficiently. Further preliminary testing involving the development of more efficient quenching techniques and the use of higher alloy steels is being carried out in the attempt to determine limiting conditions for the formation of 100% martensitic structures.

MECHANICAL PROPERTIES, WELDABILITY AND CORROSION OF COMMERCIALLY PURE TITANIUM, by H. Adenstedt. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1949. 49p photos, diagrs, graphs, tables Mi $2.50, Ph $6.25. PB 104556

Annealed and cold rolled commercially pure titanium was tested for mechanical properties, weldability, and corrosion to determine its usefulness as an aircraft structural material. The mechanical properties were satisfactory; the cold rolled material showed a lower compression yield strength in longitudinal than in transverse direction. The endurance limit of the cold rolled titanium was low because of surface defects. Titanium showed a better corrosion behavior when in contact with aluminum and magnesium alloy than stainless steel. Creep was observed to occur at room temperature when titanium was loaded near to its yield strength. The creep was more pronounced in the annealed than in the cold rolled condition. At 800°F the stress rupture values were good. Titanium is weldable by the shielded arc and spotwelding method, and normal spotwelders can be used. AAF TR 5935.

OPTIMUM FLASH WELDING CONDITIONS FOR 61S-T, 24S-T, 75S-T, and 14S-T ALUMINUM ALLOYS, by Peter Patriarca. Jan 1950. 70p diagrs, graphs, tables Mi $3.00, Ph $8.75. PB 104510

A study was made to determine optimum flash welding conditions for 61S-T, 24S-T, 75S-T, and 14S-T aluminum alloys. The effect of upset current dura-

tion and magnitude on weld strength and weld hardness were investigated. Temperature measurements were made during the upset portion of the welding cycle to determine the effect of upset variables on temperature rise of the material at and immediately adjacent to the weld line. It was found that excellent tensile joint efficiencies could be obtained with the alloys. Upset current magnitudes of less than 70,000 amp per sq in. of section for 9 cycles did not appreciably affect weld strength, and less than 50,000 amp per sq in. up to 25 cycles could be tolerated without overaging. Peak temperatures of less than 600°F, for the short time associated with flash welding, were not detrimental to weld strength. Thesis-Rensselaer Polytechnic Institute.

RESEARCH ON THE ELEMENT SILICON AND SILICON ALLOYS. BIMONTHLY REPORT NO. 1, NOV 8, 1949-JAN 15, 1950, by John M. Parks and R. A. Lubke. Armour Research Foundation, Chicago, Ill. Jan 1950. 26p diagrs, tables Mi $2.00, Ph $3.75. PB 104351

A survey and analysis of the possibility of making ductile silicon is presented. Emphasis is placed upon the importance of crystal structure and the means by which it may be altered. The literature is reviewed with regard to the preparation of silicon and the type of products obtained. The phase diagrams of silicon and the known silicides are analyzed and correlated. The postulated phase diagrams which could contain a ductile metallic phase are presented and means of evaluating metallic tendencies surveyed in a preliminary way. Experimental work consisting essentially of a study of melting practice with emphasis on crucible materials and the problem of deoxidation is reported. Contract no. AF 33(038)-8517. E. O. No. 605-232. Will not reproduce well. ARF Project 90-774B, Bimonthly report no. 1.

RESISTANCE OF POROUS STAINLESS STEEL TO FLUID FLOW, by Leon Green, Jr. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Aug 1949. 9p photos, graphs, tables Mi $1.25, Ph $1.25. PB 104551

The results of an experimental study of the flow of gas through porous stainless steel are presented. The study was made to investigate the dependance of the viscous and inertial resistance coefficients of a porous metal upon the porosity of the metal. The tests were performed with nitrogen and with the use of equipment which extended the range of measurable flow rates up to 10^{-1} psi/sec. Pressure drops as high as 1500 psi were measured across specimens 0.25 in. thick. The results of the study have led to the conclusion that the two resistance coefficient characteristics of the metal structure are both inverse power functions of the porosity. It is believed that this power relationship may be valid for metals other than stainless steel. Project Meteor. Ordcit project, Contract no. W-03-200-ord-455. CIT JPL 4-107.

SEAWATER-SPRAY CORROSION TESTS ON SPOT WELDED JOINTS IN DTD. 546 SHEET, by C. Braithwaite, H. Brooks and P. Gregory. Gt. Brit. Royal Aircraft Establishment, Farnborough, England. Feb 1950. 23p photos, diagrs, tables Mi $2.00, Ph $3.75. PB 104567

Seawater spray corrosion tests were performed on spot-welded joints in D. T. D. 546 aluminum alloy sheet. Sheet-stiffener panels were used to determine the effect of corrosion on sheet strength, and sheet-sheet panels were used to ascertain the effect of corrosion on weld strength. The panels were both protected (with normal paint, zinc pigment paint, or dip coating) and unprotected. Panels without organic protection suffered a reduction in sheet tensile properties, and there was a tendency for the strength of the weld to be reduced. Dip coating with a pigmented lanolin resin solution after welding gave good protection. Panels assembled with three special jointing compounds were also tested. Of these, a modified standard compound which completely prevented internal corrosion resulted in irregular shaped welds of occasional low strength. Tech. note MET. 118. R.A.E. Ref: M5/9600/HB/26.

75S-T6 ALUMINUM ALLOY, SOME BENDING AND DISTORTION CHARACTERISTICS, by J. C. McGee. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. May 1950. 24p photos, graphs Mi $2.00, Ph $3.75. PB 104558

An investigation was made to study the bending and distortion characteristics of 75S-T6 aluminum alloy and to compare these characteristics with those of 24S-T4 alloy. Bending failures of 75S-T6 sheet and extrusions occur suddenly by the union of numerous internal strain cracks. Only slight bending of extrusions in the longitudinal direction and no bending in the transverse direction can be made safely. The material undergoes volume changes both during solution heat treatment and aging. Distortion or warpage of 75S parts may occur during each of these heat-treating processes, as well as during quenching and machining. 24S-T4 sheet fails slowly in bending, progressing from the tension side across the metal. Cracks appear in the grains long before failure, but these are oriented at 50° to 60° to each other, and failure is somewhat of a tearing action. AAF TR 5945.

STUDY IN NON-FERROUS AND FERROUS ALLOYS AT LOW TEMPERATURES. SEVENTH QUARTERLY REPORT FOR PERIOD 1 MAR-31 MAY 1950 UNDER CONTRACT NO. W-36-039-SC-38135, by Milton Margolis and Alfred Bornemann. Stevens Institute of Technology. Pierce Memorial Laboratory for Metallurgy, Hoboken, N. J. Jun 1950. 56p graphs, tables Mi $2.75, Ph $7.50. PB 104565

Results are given of room and low-temperature tensile, impact, and fatigue tests on commercial 50 tin-50 led and 60 tin-40 lead solder and solder alloys after four months storage at various subnormal temperatures. Additional observations regarding the dilatometric study of the transformation of pure tin and various solder alloys are included. The strength tests disclosed no embrittlement due to the phase transformation of the tin. In the dialatometric tests, uninoculated pure tin at -100°F started to transform in about 360 hr and the reaction was substantially completed in an additional 100 hr. Inoculated pure tin at -100°F started to transform in about 18 hr and the reaction practically ceased after 100 hr. It was also determined that the endurance limit of grade A phosphor bronze in the annealed condition is 19,000 psi at room temperature and 30,000 psi in the spring temper condition. Dept. of the Army project: 3-93-00-500. Signal Corps project: 2005.

STUDY OF CHROMIUM-FRIT-TYPE COATINGS FOR HIGH-TEMPERATURE PROTECTION OF MOLYBDENUM, by D. G. Moore, L. H. Bolz, J. W. Pitts and W. N. Harrison. U. S. National Advisory Committee for Aeronautics. Jul 1951. 39p photos, diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104651

A number of chromium-frit-type coatings bonded to molybdenum specimens by firing in controlled atmospheres at 2400°F to 2700°F were studied. Durability of the coatings was principally determined by oxidation tests under load at 1500° to 1800°F and by flame test at 2000° to 3000°F. Results indicate that these coatings may be of practical use at elevated temperatures where long time protection is non-essential or at low temperatures where loading is such that creep rates will be moderate. NACA TN 2422.

TESTS OF THE PROTECTIVE VALUE OF TEMPORARY PROTECTIVES ON STEEL, by S. G. Clarke and E. E. Longhurst. Gt. Brit. Ministry of Supply. Armament Research Establishment. Jul 1950. 18p photos, drawing, fold graph, tables Mi $1.75, Ph $2.50. PB 104570

Tests were conducted by the British Armament Research Establishment (ARE) on temperary protective coatings for steel panels as a means of determining the degree of corrosion resistance afforded to the steel by oil and lanolin films. It was found that free exposure to the outdoor atmosphere, the ARE salt-spray test, and a nonstreaming humidity test gave comparable orders of merit for these types of protectives on steel. The outdoor exposure was generally too severe and variable for testing oil films, therefore, a sprayed-on-water-droplet test was employed in such cases. An increasing protection with rising film weight of lanolin was demonstrated by outdoor tests. Extremely thin oil films produced an appreciable reduction in the weight of steel corroded in the ARE salt spray test. Metallurgical report no. 6/50.

THERMAL EXPANSION CHARACTERISTICS OF BERYLLIUM, by R. M. Treco. Massachusetts Institute of Technology, Cambridge, Mass. Mar 1950. 35p diagrs, graphs, tables Mi $2.25, Ph $5.00. PB 104557

The thermal expansion characteristics of vacuum cast beryllium were studied. Linear thermal expansion coefficients for extruded and annealed polycrystalline beryllium were determined for a wide range of temperatures; the results were compared with those of other investigators. The effect of preferred orientation on the expansion coefficients was discussed. The linear expansion coefficients of a single crystal of beryllium were determined parallel and perpendicular to the hexagonal axis. The volume coefficient of expansion in the range of 0 - 50°C was discussed. Work carried out at the MIT Metallurgical project under Contract W-7405-eng-175 with the Atomic Energy Commission. MIT 1043.

THERMAL PROPERTIES, CRYSTAL STRUCTURE, DENSITY, SPECTRA AND OTHER PHYSICAL PROPERTIES OF ALUMINUM AND ITS OXIDES, AL_2O_3 AND AL O. TECHNICAL REPORT UNDER CONTRACT W33-038-AC-17721, by M. G. Holladay, C. W. Beckett and H. L. Johnston. Ohio State University. Cryogenic Laboratory, Columbus, Ohio. Apr 1950. 73p tables Mi $3.50, Ph $10.00. PB 104462

A literature survey was made of the physical properties of aluminum and its oxides, Al_2O_3 and A10, with particular emphasis on thermal properties. The review covered crystal structure, density, thermal expansion, thermal conductivity, spectra, and other properties. The thermal functions of gaseous aluminum and gaseous A10 was calculated from spectroscopic data. The equilibrium constants for some reactions involving aluminum, Al_2O_3, and A10 were also calculated. The data are discussed, tabulated, and in some instances evaluated. A bibliography of approximately 350 references is included.

ZIRCONIUM ALLOYS FOR HIGH TEMPERATURE SERVICE, by Stephen M. Shelton. U. S. Air Materiel Command. Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1949. 74p graph, tables Mi $3.50, Ph $10.00. PB 104550

Approximately 25 zirconium-rich alloys were prepared and their suitability for high temperature applications was investigated. The results of heat resistance studies conducted by means of air exposure indicated that none of the alloys could be considered for service above 1400°F; many practically disintegrated at 1200°F. A weight gain of 600 milligrams per square decimeter per day was used to determine serviceability. As the alloy additions are increased, the alloys become richer in an intermediate phase which corresponds to ZrX_2 in most of the systems. The alloys became less workable as the amount of this phase increases. The alloy additions resulted in higher room temperature yield strengths for all alloys. The highest yield strength was about equal to Monel at the same temperature. Further study of chemical corrosion resistance, constitutional and mechanical properties appears logical. Prepared by U. S. Bureau of Mines, Metallurgical Div., Albany, Oregon, under Contract no. W33-038-47-4493E during the period 1 July 1947 to July 1, 1949. Report no. 11. AAF TR 5932.

MINERALS AND MINERAL PRODUCTS

AERATED CONCRETE (PART II). Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, England. Apr 1951. 4p Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.05. PB 104576

1. Concrete, Air-entrained - Gt. Brit. 2. DSIR BRD 29.

CERAMIC HIGH-K TITANATE IMPROVEMENT EVALUATION. FIRST QUARTERLY REPORT 1 JUNE 1949 - 31 AUGUST 1949 ON CONTRACT NO. W36-039-SC-44534, by R. L. Mayer. Erie Resistor Corporation, Erie, Pa. Aug 1949. 33p graphs Mi $2.25, Ph $5.00. PB 104393

Various ceramic titanate dielectric bodies were tested to determine variations in electrical and strength characteristics. The tests performed on the specimens included permitivity, power factor, temperature coefficient of capacitance, volume and surface resistance, dielectric strength, life test, creep flash test, specific gravity, and thermal shock. The status of each of the tests is discussed and results are given. Only the thermal shock test was completed. File no. 15805-PH-49-5.

CHROMITE PROBLEM OF THE UNITED STATES, by William Henry Drake. Jan 1950. 98p diagr, graphs, tables Mi $4.25, Ph $12.50. PB 104487

The importance of chromite to the United States industry and its relationship to the security of the United States are discussed. The sources of supply and demand for chromite during the 1930's and during wartime are summarized. The war focused attention on the reserves of and the need for stockpiling chromite. The search for new ore bodies during the war failed to uncover any new deposits capable of making the United States more self-sufficient and emphasized the dependency on foreign sources. Experimental work in discovering a means of utilizing low-grade domestic ores was equally unsuccessful. The present program for reserves and stockpiling is described. Thesis-University of Texas.

CONCRETE IN SULPHATE-BEARING CLAYS AND GROUND WATER. Gt. Brit. Dept. of Scientific Industrial Research. Building Research Station, Watford, England. Jun 1951. 8p tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.10. PB 104605

1. Concrete - Deterioration - Prevention - Gt. Brit. 2. Soils, Sulfate containing - Effect on concrete - Gt. Brit. 3. Clay, Sulfate containing - Effect on concrete - Gt. Brit. 4. Sulfates - Effects - Gt. Brit. 5. Water, Underground - Effects - Gt. Brit. 6. DSIR BRD 31.

S. O. Code no. 72-22-0-31.

CRAZING ON CONCRETE BUILDING STONE; A DETERMINATION OF STRESSES INDUCED BY TEMPERATURE CHANGES, by J. E. Buchanan and William Schroeder. Idaho. Engineering Experiment Station, Moscow, Idaho. Aug 1932. 39p photos, diagrs, graphs, tables Available from University of Idaho, Engineering Experiment Station, Moscow, Idaho. PB 104607

1. Concrete - Deterioration 2. Concrete - Thermal properties 3. Concrete - Stresses 4. ID EES B3.

University of Idaho bulletin, vol. XXVII, no. 16. First progress report. For second report see PB 104608.

CRAZING OF CONCRETE BUILDING STONE; A STUDY OF SOME MOISTURE DIFFUSION PROPERTIES OF CONCRETE, by A. J. Davidson. Idaho. Engineering Experiment Station, Moscow, Idaho. May 1937. 26p graphs, diagr, tables Available from University of Idaho, Engineering Experiment Station, Moscow, Idaho. PB 104608

1. Concrete - Deterioration 2. Concrete - Drying 3. ID EES B4.

University of Idaho bulletin, Vol. XXXII, no. 18. Second progress report, For earlier report see PB 104607.

DEVELOPMENT OF CORDIERITE TYPE CERAMIC BODIES. PROGRESS REPORT NO. 1 ON CONTRACT NO. W-36-039-SC-32298, AUG 15, 1946-NOV 15, 1948, by H. R. Wisely and K. A. Gebler. Rutgers University. Dept. of Ceramics, New Brunswick, N. J. Nov 1946. 31p diagr, graphs, table Mi $2.25, Ph $5.00. PB 104545

1. Cordierite 2. Ceramic materials 3. SIG Contract W-36-039-sc-32298, Report no. 1.

DEVELOPMENT OF CORDIERITE TYPE CERAMIC BODIES. PROGRESS REPORT NO. 3 ON CONTRACT NO. W-36-039-SC-32298, FEB 15, 1947-MAY 15, 1947, by H. R. Wisely and K. A. Gebler. Rutgers University. Dept. of Ceramics, New Brunswick, N. J. May 1947. 35p tables Mi $2.25, Ph $5.00. PB 104547

1. Cordierite 2. Ceramic materials 3. SIG Contract W36-039-sc-32298, Report no. 3.

DEVELOPMENT OF CORDIERITE TYPE CERAMIC BODIES. PROGRESS REPORT NO. 4 ON CONTRACT NO. W-36-039-SC-32298, MAY 15, 1947-AUG 15, 1947, by H. R. Wisely and K. A. Gebler. Rutgers University. Dept. of Ceramics, New Brunswick, N. J. Aug 1947. 57p tables Mi $2.75, Ph $7.50. PB 104548

1. Cordierite 2. Ceramic materials 3. SIG Contract W-36-039-sc-32298, Report no. 4.

DEVELOPMENT OF LOW DIELECTRIC CONSTANT GLASSES. SECOND INTERIM ENGINEERING REPORT, NOV 1, 1949 TO FEB 1, 1950, UNDER CONTRACT NO. AF33(038)-8063, PREPARED by W. A. Dunn. Glass Fibers, Inc., Waterville, Ohio. Feb 1950. 13p graphs, tables Mi $1.75, Ph $2.50. PB 104554

Progress is reported in the development of low dielectric constant glasses. A number of glasses were prepared and dielectric constants were measured for each sample. The glass were composed of SiO_2, B_2O_3, Al_2O_3, and alkali oxides. The oxides of lithium, potassium, and sodium were used in various combinations to make up the 4% alkali content. Glasses containing Li_2O as part of the alkali were the easiest to melt and made the most fluid castings. The lithium glasses also showed a tendency to devitrify. For glasses containing only one alkali oxide, the best fluxing action and fluidity were obtained using 4% Li_2O, followed by Na_2O and K_2O. In general, the variation in dielectric constant is not appreciable over the whole range of compositions in this series.

DETERMINATION OF THE MOST SUITABLE AVAILABLE INSULATION MATERIALS FOR INSULATING HIGH-SPEED AIRCRAFT AND MISSILES. FINAL REPORT ON CONTRACT NO. W33-038-AC-16821, by I.B. Fieldhouse and O.E. Teichmann. Armour Research Foundation, Chicago, Ill. Sep 1949. 138f photos, graphs, tables Mi $5.50, Enl Pr $18.75. PB 104479

The properties were studied of materials available for insulating high-speed aircraft and missiles during transient heat flow when their outer surfaces are at an elevated temperature. In the first study phase, a survey of the literature and of the industry was made. The second phase comprised an evaluation of the phase 1 data and lead to the selection of promising materials, the thermal properties of which were measured. An equation was also derived, which makes it possible to calculate the instantaneous temperature distribution and material thickness required when the outer surface temperature varies according to a specified pattern. In the third phase, the effect of vibration and acceleration on various insulating materials was covered, and compressive load-deformation, curves were plotted offering a means of classifying insulations as either "packing" or "nonpacking" materials. Project no. 90-511D. Revised edition; supersedes edition dated 10 May 1949.

EFFECT OF DEFECTS ON THE TENSILE AND COMPRESSIVE PROPERTIES OF A GLASS-FABRIC-BASE PLASTIC LAMINATE, by Fred Werren and B. G. Heebink. U. S. Forest Products Laboratory, Madison, Wis. Jun 1950. 23p drawings, graphs, tables Available free from Forest Service, U. S. Dept. of Agriculture, Washington 25, D. C. PB 104390

Tension and compression tests were conducted to determine the effect of defects in glass-fabric-base plastic laminates on the mechanical properties. Panels were fabricated with five types of defects: high resin content, low resin content, wrinkles, butt joints, and lap joints. A total of 52 tension and 52 compression tests were made. An increase in resin content resulted in lower values of modulus of elasticity, of proportional limit, and of ultimate stress in tension, and in a lower modulus of elasticity but a higher ultimate stress in compression. A decrease in resin content results in higher mechanical properties. Surface wrinkles were found to lower the strength in tension and in compression. But joints lower the tensile strength, but the compressive strength (within limits) is not appreciably affected. The efficiency of the lap joint would be expected to indicate the tensile strength of the laminate. This report is one of a series issued in cooperation with the Air Force-Navy-Civil Subcommittee on Aircraft Design Criteria under the supervision of the Aircraft Committee of the Munitions Board. FPL 1814.

FIELD STUDY OF CRAZING ON CONCRETE BUILDING STONE, by J. E. Buchanan. Idaho. Engineering Experiment Station, Moscow, Idaho. Jul 1931. 23p photos, diagr, graphs Available from University of Idaho, Engineering Experiment Station, Moscow, Idaho. PB 104606

1. Concrete - Deterioration 2. ID EES B2.

University of Idaho bulletin vol. XXVI, no. 10. For later reports see PB 104607-104608.

ISSLEDOVANIE SKOROSTI GIDRATATSII PORTLAND-TSEMENTOV I SOSTAVLIAYUSHIKH IKH SOELINENII (RATE OF HYDRATION OF PORTLAND CEMENTS AND THEIR COMPOUNDS), by U. M. Butt. Mar 1949. 13p graph, tables (Text in Russian) Mi $1.75, Ph $2.50. PB 104474

A study of the rate of hydration of clinker-type minerals having a grain size of 30 to 55 mu has shown that C_3A has the highest rate of hydration, followed by C_4AF, C_3S and C_2S as having the slowest rate of hydration. The depth of hydration of clinker minerals within a period of concretion lasting 6 months amounts to 3 to 15 mu which points toward the requirement for a finer milling of the cement in order to utilize more fully its binding qualities. The rate of hydration of Portland cement with a rest period of 3 months amounts to an average of 60 to 80%, the rate being higher than the rate of hydration of its separate compounds. An increased content of C_4AF and C_2F and decreased content of C_3A reduce the rate of hydration of cements. Reprinted from Zhurnal prikladnoi khimii, t. 22, no. 3, p. 223-234.

O KHIMICHESKOI STOIKOSTI STEKLA (CHEMICAL STABILITY OF GLASS), by N. K. Dermev, B. P. Zverev and R. Ya. Khvilivitsky. Mar 1949. 6p tables Mi $1.25, Ph $1.25. PB 104475

The chemical stability of glass in processes, at which the infraction of the complete protective layer may occur (formation of microcracks, break of layer), depends upon the chemical composition of the powder, the condition of the surface, and degree of fritting. The infraction of the surface layer is caused to a greater degree by poor fritting of the glass. Treatment with alumina solution increases the chemical stability of glass and also prevents further formation of microcracks and fissures in the surface of the layer. Treatment of glass with alumina solution for the purpose of increasing its chemical stability should find practical application in industry. Reprinted from Zhurnal prikladnoi khimii t. 22, no. 3, p. 235-239.

PROPERTIES OF PLAIN AND REINFORCED LIMEROCK CONCRETE, by S. L. Bugg and D. A. Firmage. Florida. Engineering and Industrial Experiment Station, Gainesville, Fla. Aug 1950. 36p photos, maps, graphs, tables Mi $2.25, Ph $5.00. PB 104483

Special properties of Florida limerock, one of the abundant materials available to Florida construction projects, are examined. Earlier research work on the uses of this limerock in specialized products was continued and was directed principally toward determination of properties and methods of control of the manufacture of limerock concrete. Among major considerations were the occurence, description, and physical properties of limerock, limerock mortor, plain and hardened limerock concrete, and bond tests between reinforcing bars and limerock concrete. Results of the latter bond test study are presented as: bond strength vs length of embedment, bond strength vs mix design, bond strength vs surface conditions of rods, bond strength vs curing time, and bond strength vs 28 day compressive strength. Engineering progress at the University of Florida, vol. IV, no. 8. FEES B36.

PUMICE AS AGGREGATE FOR LIGHTWEIGHT STRUCTURAL CONCRETE, by William C. Wagner, Walter E. Gay, Dexter H. Reynolds. New Mexico. Engineering Experiment Station, Albuquerque, N. Mex. 1950. 37p graphs, tables Available from Editor of Publications, University of New Mexico, Albuquerque, N. Mex. $1.00. PB 104668

1. Concrete aggregates 2. Pumice - Use in concrete.

University of New Mexico publications in engineering no. 5.

RESEARCHES ON BRICK, by Claes Hedin, J. Arvid Hedvall and Bengt Aggeryd. Sweden. Kungl. Tekniska Högskolan, Stockholm. 1950. 56p photos, diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 103800

The main chemical components of clay CaO, Al_2O_3, Fe_2O_3 and SiO_2 have been investigated both separately and in 2, 3 and 4 component systems. The obtaining of a red colour of brick requires when firing the presence of both Fe_2O_3 and Al_2O_3, a fixed solution between these oxides then being formed. In the three-component system $CaO-Al_2O_3-Fe_2O_3$ there appears a yellow colour when the contents of both CaO and Al_2O_3 are high. The colour may be varied by the admixture of chemicals in the clay, providing it is done so that the contact between the clay and the admixture material is very intimate. Color in photos will not reproduce. Acta polytechnica 72, Chemistry including metallurgy series vol. 2, nr. 5. Also issued as Kungl. Tekniska Högskolans Handlingar nr. 37 and 64.

STUDY OF THE DEVELOPMENT OF THIN CERAMIC FILMS. FIRST QUARTERLY REPORT FOR PERIOD ENDING 31 MAY 1949 ON CONTRACT NO. W36-039-SC-38248, by M. U. Cohen and Lewis Balamuth. Balco Research Laboratories, Newark, N. J. May 1949. 34p diagrs Mi $2.25, Ph $5.00. PB 104388

Progress is reported in the development of ultra-thin-type ceramic films. A number of materials were investigated for their suitability as supporting base, and titania and barium titanate were found to be satisfactory. Preliminary work with conducting metal film showed that sputtered films on titania and barium titanate were adequate, and that this combination could be used as the underlying structure to support ultra-thin ceramic films. Spinning and vacuum evaporation methods were developed to arrive at a solution deposition of the thin films. A saturated solution of barium oxide in methyl alcohol was used to prepare a barium containing film. Both barium- and titanium-type films were produced by vacuum evaporation. File no. 11011-PH-49-5-(3724). Dept. of the Army Project no. 3-99-15-022. Signal Corps Project no. 32-152B-O.

SYNTHETIC MICA. SUMMARY PROGRESS REPORT FOR YEAR 1949, by R. A. Hatch, W. Eitel and R. A. Humphrey. Electrotechnical Laboratory, Norris, Tenn. n.d. 11p Mi $1.75, Ph $2.50. PB 104488

The studies conducted during the year 1949 on the synthetic mica program are summarized. These studies are concerned with the following phase: the isomorphism of synthetic fluorine-micas, methods of batch handling and processing, crucible development and manufacture, mica crystallization studies, furnace design and operation studies, instrumentation problems, determination of physical and chemical properties of synthetic mica, and the development of a hot-pressed polygranular mica ceramic material. Code NAonr-35-47, Project NR 032-149. Report N-30.

TESTS TO DETERMINE RELATIONSHIP BETWEEN HEATING PATTERN AND POINT OF GLASS FAILURE, by J. W. Ward. Boeing Airplane Co., Seattle, Wash. Dec 1949. 28p photos Mi $2.00, Ph $3.75. PB 104485

Tests were made to determine the relationship between the windshield heating pattern and the point of glass failure. The windshields were examined before test and the voltage necessary to produce an average power dissipation of 3000 Btu/ft^2/hr was calculated. The windshields were placed in a cold box and the temperature lowered to -50°F. The windshields were removed and the voltage was applied. The first points at which ice melted, the heating pattern, time of first ice melting, and time of failure was recorded. Voltage was removed when the window failed, when all ice melted, or when the vinyl bubbled. If no failure occurred, the test was repeated. Outer pane failures originating at the tips of the shortest bus were consistently produced. The origin of the failures coincided with the location of the hot spot at the bus tip. Film irregularities caused a glass failure originating at the edge of the outer pane. Contract no. W36-038-ac-15587. Test no. T-27763.

THERMAL EXPANSION OF CONCRETE, by D.G. R. Bonnell and F. C. Harper. Gt. Brit. Dept. of Scientific and Industrial Research. Building Research Station, Watford, England. 1951. 30p diagr, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35. PB 104584

1. Concrete - Expansion - Gt. Brit. 2. Concrete aggregates - Gt. Brit. 3. DSIR NB TP 7.

THERMAL INSULATING AND RADIATION SUPPRESSIVE COATINGS. REPORT NO. 42, by Dwight G. Bennett and Robert G. Hicks. U. S. Air Materiel Command. Engineering Division. Power Plant Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1949. 14p photos, tables Mi $1.75, Ph $2.50. PB 104159

The formulation and development of refractory ceramic top coatings for protection and insulation of low-carbon steel and ingot iron at elevated temperatures are described. Tests were made to determine the advantages of using soda niter in place of soda ash in the raw batch. It was found that the source of soda exerted little effect. Systematic variations were made in the percentages of CaO, ZnO and MgO. It was found that an increase in MgO, at the expense of either CaO or ZnO, produced more durable coatings. Accelerated life tests were run using various of the coatings on low carbon steel and ingot iron. Tables of compositions and photographs of resulting test specimens are included. Report was prepared by the University of Illinois, Department of Ceramic Engineering, Urbana, Illinois, under USAF Contract no. W33-038-ac-14520 (16071), Project MX-1035. ILU DGE 42. AAF TR 6057.

THERMAL SHOCK FAILURE OF HOLLOW CERAMIC CYLINDERS, by J. H. Westbrook and J. Wulff. Massachusetts Institute of Technology, Cambridge, Mass. Aug 1949. 19p photos, diagrs, graphs, tables Mi $1.75, Ph $2.50. PB 104165

An experimental investigation of the thermal shock failure of internally heated hollow ceramic cylinders is discussed. The thermal shock test seems to be superior to previous tests in that it is capable of yielding quantitative data which can be directly correlated with the theory. The experiments qualitatively confirm the elastic analysis, which predicts that failure is due to tangential stresses at the outside surface of one end of the cylinder. The test is sufficiently quantitative to permit direct correlation of the data with the elasticity theory. Experimental results, however, indicate a wide scatter in the thermal-shock resistance of ceramic cylinders from the same fabrication lot. Massachusetts Institute of Technology. Guided missiles program: Meteor report no. 43. Operating under Bureau of Ordnance Contract NOrd 9661 with the Division of Industrial Cooperation on Technical Tasks for the Bureau of Ordnance of the Navy Department.

THERMAL SHOCK RESISTANCE OF METALLIZED HOLLOW CERAMIC CYLINDERS, by J. H. Westbrook and J. Wulff. Massachusetts Institute of Technology, Cambridge, Mass. Aug 1949. 18p photos, drawings, graphs, tables Mi $1.75, Ph $2.50. PB 104160

An investigation was made of the use of prestressing to improve the resistance of hollow ceramic cylinders to thermal shock caused by sudden internal heating. Of the several prestressing techniques, shrink fitting was chosen for experimental study. The metal-spraying process was employed for obtaining the shrink-fit stresses, since reguline metal

tubes cannot be shrunk on bodies of complex rotational symmetry. Various techniques were developed for different combinations of metal and ceramic. Some of these techniques more than doubled the time required for initiation of failure under fixed conditions of thermal shock. The metal spraying process was found to prevent the ceramic from disintegrating after shock failure has taken place. Massachusetts Institute of Technology. Guided missiles program: Meteor report no. 44. Operating under Bureau of Ordnance Contract NOrd 9661 with the Division of Industrial Cooperation on Technical Tasks for the Bureau of Ordnance of the Navy Department.

PHYSICS

General

DEVELOPMENT OF SOME EXTENSIONS OF PATTERSON'S PRINCIPLES AND THEIR APPLICATION TO THE SOLUTION OF CRYSTAL STRUCTURES, by Dan McLachlan, Jr. Utah. Engineering Experiment Station, Salt Lake City, Utah. Dec 1950. 41p diagrs, graphs, tables Available from The Director, Utah Engineering Experiment Station, Salt Lake City, Utah. PB 103999

This paper presents some extensions of the principles laid down by Patterson for the solution of structures of crystals. The basis of these extensions is the possibility that not only can one make projections in which F^2 coefficients are used in a Fourier series, but also one can use F^n coefficients, where n may be odd, even, positive, or negative. The use of the mixed projections is illustrated for two crystalline compounds using "Theoretical" projections, and for one compound using computed Fourier projections. This method should have wide application for those structures in which Patterson projections furnish resolvable peaks because it gives the structures directly. Methods and devices for performing the various types of theoretical projections are described. Bulletin no. 50. Bulletin of the University of Utah, vol. 41, no. 5. UU EES B50.

K TEORII RASPROSTRANENIA PLAMENI. (THEORY OF FLAME PROPAGATION), by Y. B. Zeldovich. Jun 1951. 39p diagrs Mi $2.25, Ph $5.00. PB 104247

Equations are presented for heat conduction and diffusion in a flame, taking into account the chemical reaction. Temperature distribution in the flame and conditions required for a constant flame velocity are considered. A method is given for determining the flame velocity for a given relation between diffusion and heat conduction by numerical integration and its uniqueness is demonstrated. Equations are also given for flame propagation in a chain reaction. Translation from Zhurnal Fizicheskoi Khimii (USSR), T. 22, 1948, pp. 27-49. NACA TM 1282.

METHOD FOR THE CALCULATION OF THE TURBULENT BOUNDARY LAYER IN A PRESSURE GRADIENT, by Paul S. Granville. U. S. David W. Taylor Model Basin, Carderock, Md. May 1951. 43p diagrs, graphs, tables Mi $2.50, Ph $6.25. PB 104316

A method is described for the calculation of the development of incompressible turbulent boundary layers in pressure gradients, so that drag and separation of flow may be predicted more accurately. The principal contribution is the formulation of new relations for the variation with pressure gradient of 1, the shearing stress at the wall (local skin friction) and of 2, the integral of the shearing stresses across the boundary layer for use in a moment-of-momentum equation recently derived by Tetervin and Lin. With the assumption of the one-parameter characterization of velocity profiles by a shape parameter H, the moment-of-momentum equation and the von Karman momentum equation constitute a working method involving the solution of a pair of simultaneous first-order differential equations. As an introduction to the subject of turbulent boundary layers in pressure gradients, a review of previous methods is included in this report. DWTMB no. 752.

NOTE ON THE APPLICATION OF THE LINEARISED THEORY FOR COMPRESSIBLE FLOW TO TRANSONIC SPEEDS, by A. Robinson and A. D. Young. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Jan 1947. 6p graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.35. PB 104398

It is shown that for finite aspect ratio the linearised theory of compressible flow remains theoretically consistent in the region of transonic speeds, although its predictions may deviate appreciably from experimental results in that region. The variation of the theoretical lift-curve slope of an aerofoil of finite span is considered as the Mach number increases from below unity to above unity, and it is shown that the lift-curve slope remains finite and continuous. Cover date is 1951. S. O. Code no. 23-2399. ARC RM 2399.

POISSON DISTRIBUTION, by Norman Smith. Aug 1949. 66f graphs, tables Mi $3.00, Enl Pr $10.00. PB 104223

Important concepts associated with the Poisson distribution are described together with applications of sampling theory to the Poisson distribution, the Cram-Charlier type B series, and applications of the Poisson distribution to statistical quality control. Thesis-University of Iowa, Iowa City, Iowa.

PRIBLIZHENNYI METOD INTEGRIRORANIA URAVNENII LAMINARNOGO POGRANICHNOGO SLOIA V NESZHIMAEMOM GAZE (APPROXIMATE METHOD OF INTEGRATION OF LAMINAR BOUNDARY LAYER IN INCOMPRESSIBLE FLUID), by L. G. Loitsianskii. Jul 1951. 21p graphs Mi $2.00, Ph $3.75. PB 104725

A method is given for the approximate solution of the equations of the two-dimensional laminar boundary layer in an incompressible fluid. The method is based on the use of a system of equations of successive moments that is easily solved for simple supplementary assumptions. The solution obtained is given in closed form by simple formulas and is claimed to be no less accurate than the complicated solutions previously obtained, which were based on the use of special classes of flows. Translated from Prikladnaya matematika i mekhanika, vol. 13, no. 5, Oct 1949, p. 513-525. NACA TM 1293.

SINGULARITIES AT THE SONIC VELOCITY, by Dr. K. Gottfried Guderley. (Project HA-219). U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1948. 26p diagrs (part fold) graphs Mi $2.00, Ph $3.75. PB 104235

The hodograph map of a body in parallel flow has a singularity at the point which corresponds to the velocity at infinity; therefore, in a flow with a free-stream Mach number 1, a singularity at the sonic velocity will arise. This example is only a special case for a whole class of singularities at the sonic velocity. This report gives the general theory for them, provides the formulas necessary for applications and deals with some examples. The basic hypothesis uses a hodograph equation simplified by the transonic law of similarity. The expression for the singularities can be regarded as a product hypothesis in a suitable system of coordinates. It leads to a hypergeometric differential equation. The well-known mathematical properties of such equations allow a far-reaching general discussion of such solutions. The first applications deal with some problems of primarily theoretical interest: the reflections of singularities at the sonic line; the flow over a corner; the flow through the throat of a Laval nozzle; singularities at a free jet; and the flow past a body at the free-stream Mach number 1. AAF TR 1171 ND.

SUMMARY OF METHODS FOR CALCULATING DYNAMIC LATERAL STABILITY AND RESPONSE AND FOR ESTIMATING LATERAL STABILITY DERIVATIVES, by John P. Campbell and Marion O. McKinney. U. S. National Advisory Committee for Aeronautics. Jul 1951. 99p diagrs, graphs, tables Mi $4.25, Ph $12.50. PB 104722

A summary of methods for making dynamic lateral stability and response calculations and for estimating the aerodynamic stability derivatives required for use in these calculations is presented. The processes of performing calculations of the time histories of lateral motions, of the period and damping of these motions, and of the lateral stability boundaries are presented as a series of simple straightforward steps. Existing methods for estimating the stability derivatives are summarized and, in some cases, simple new empirical formulas are presented. Detailed estimation methods are presented for low-subsonic-speed conditions but only a brief discussion and a list of references are given for transonic- and supersonic-speed conditions. NACA TN 2409.

ÜBER STABILITÄT UND TURBULENZ VON FLÜSSIGKEITSSTRÖMEN. (ON STABILITY AND TURBULENCE OF FLUID FLOWS), by Werner Heisenberg. Jun 1951. 60p diagrs Mi $2.75, Ph $7.50. PB 104289

This investigation is divided into two parts, the treatment of the stability problem of fluid flows on the one hand, and that of the turbulent motion on the other. The first part summarizes all previous investigations under a unified point of view, that is, sets up as generally as possible the conditions under which a profile possesses unstable or stable characteristics, and indicates the methods for solution of the stability equation for any arbitrary velocity profile and for calculation of the critical Reynolds number for unstable profiles. In the second part, under certain greatly idealizing assumptions, differential equations for the turbulent motions are derived and from them qualitative information about several properties of the turbulent velocity distribution is obtained. Translated from Annalen der Physik, Band 74, no. 15, 1924. NACA TM 1291.

VARIATIONAL SOLUTION OF SCATTERING PROBLEMS, by William Solifrey. New York University. Washington Square College. Mathematics Research Group. Mar 1949. 33f Mi $2.25, Enl Pr $6.25. PB 104203

A method for computing the back-scattering cross section of arbitrary obstacles by means of variational techniques is explained. The diffraction problem is formulated and transformed into an integral equation. A general theorem then relates the solution of the integral equation to the solution of a variational problem. The variational form is shown to be directly related to the scattering cross section, in particular, to the back-scattering cross section. The method is applicable to the scattering of plane waves by fixed rigid obstacles of arbitrary shape and to the scattering of electromagnetic waves by conducting cylinders Research report no. EM-11.

Nuclear

ISOTOPIC ANALYSIS OF DEUTERIUM OXIDE BY DENSITY DETERMINATIONS, by I. A. W. Morrison, B. Smith, R. Walsh. National Research Council of Canada. Atomic Energy Project. Sep 1949. 11p graph, tables Available from National Research Council of Canada, Ottawa, Canada. $.15. PB 104658

1. Atomic power - Research - Canada 2. Water, Heavy - Isotopes - Canada 3. Water, Heavy - Density - Canada 4. Pynknometers - Canada 5. NRCC AEP CRE-449 6. NRCC 2389.

RELATION OF APPARENT TO TRUE PH IN DEUTERIUM SOLUTIONS, by R. G. Hart. National Research Council of Canada. Atomic Energy Project. Jun 1949. 14p diagr, graphs, tables Available from National Research Council of Canada, Ottawa, Canada. $.15. PB 104654

1. Hydrogen ion concentration - Determination - Canada 2. Deuterium solutions - Analysis - Canada 3. Atomic power - Research - Canada 4. NRCC AEP CRE-423 5. NRCC 2385.

PSYCHOLOGY

CONSTRUCTION OF A SIMPLIFIED ARMY PREFERENCE BLANK: FINAL REPORT, by G. Frederick Kuder. U. S. Adjutant General's Office. Personnel Research Section. Jan 1951. 37p tables Mi $2.25 Ph $5.00. PB 104003

1. Personality tests 2. Duke University. Dept. of Psychology 3. WD AGO PRS PR 4154.

Department of the Army Research Contract no. DA-49-083 OSA-45.

EFFECTS OF INCREASED POSITIVE RADIAL ACCELERATION ON REACHING AND MANIPULATING TOGGLE SWITCHES, PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE, by G. L. Bryan, R. C. Wilson, N. E. Willmorth, D. W. Svenson, G. A. Green, N. D. Warren. University of Southern California. Psychological Laboratory, Los Angeles, Calif Jun 1951. 19p photo, diagr, tables Mi $1.75, Ph $2.50. PB 104578

1. Motion and time study 2. Psychological tests 3. Centrifuges, Human.

Report no. V.

INFLUENCE OF TYPE OF INSTRUCTIONS ON THE PERFORMANCE OF A PERCEPTUAL-MOTOR TASK, by William V. Hagin. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. May 1951. 31p tables Mi $2.25, Ph $5.00. PB 103922

1. Psychomotor tests 2. Coordination tests 3. AAF HRRC RB 51-7.

Project no. 21-09-004.

JOINT CONVERSION TABLES FOR AIR FORCE APTITUDE INDICES AND ARMY APTITUDE AREAS, by Virginia Zachert. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. Mar 1951. 37p tables Mi $2.25, Ph $5.00. PB 103920

1. Ability tests 2. AAF HRRC RB 51-5.

Project no. 21-03-034.

PSYCHOLOGICAL RESEARCH ON THE HUMAN CENTRIFUGE. FINAL REPORT, PREPARED by Glenn L. Bryan, Robert C. Wilson, Norman E. Willmorth, Donald W. Svenson, Neil D. Warren. University of Southern California. Psychological Laboratory, Los Angeles, Calif. Jun 1951. 18p Mi $1.75, Ph $2.50. PB 104579

1. Psychological tests 2. Centrifuges, Human.

Contract N6ori-77, Task III.

SIMPLIFIED-VOCABULARY REVISION OF THE ARMY PERSONALITY INVENTORY: FINAL REPORT by Walter H. Wilke and W. D. Glenn, Jr. U. S. Adjutant General's Office. Personnel Research Section. Jan 1951. 37p graphs, tables Mi $2.25, Ph $5.00. PB 104004

1. Personality tests 2. Vocabulary tests 3. New York University, New York, N. Y. 4. WD AGO PRS PR 4111-14C.

Department of the Army Research Contract WSW 2499. PRA PR 4111-14C.

SURVEY OF HUMAN ADJUSTMENT PROBLEMS IN THE NORTHERN LATITUDES: STUDY OF ADJUSTIVE, NON-ADJUSTIVE BEHAVIOR AS REFLECTED BY VARIATIONS OF SHIFTS IN DISPOSITION BY AIR FORCE PERSONNEL ASSIGNED TO MONTANA, PRE-WINTER, by Anthony Debons. U. S. Air Force. Arctic Aeromedical Laboratory, Ladd Air Force Base, Alaska. Feb 1951. 21p graphs, table Mi $2.00, Ph $3.75. PB 104532

1. Personality tests 2. Personnel, Flying - Psychological records 3. Cold - Psychological effects 4. AAF AAL Project 21-01-022 Part IV, Program E.

SURVEY OF STUDIES OF RHYTHM, by Joseph Weitz and Kenwood L. Fair. U. S. Air Force. Human Resources Research Center, Lackland Air Force Base, San Antonio, Texas. Mar 1951. 35p Mi $2.25, Ph $5.00. PB 103891

The present report is one part of an investigation of rhythmic performance carried out under Contract AF 33(038)-10413. It represents an attempt to bring up to date information about studies on rhythm and rhythmic ability and to fit these into a reasonable framework. Research studies are summarized under the following headings: Perceptual Studies of Rhythm; Studies of Accenting and Grouping; Rhythm Preferences; Time Estimation; Studies of Rhythm Involving Motor Performance; and Basis of Rhythm. Investigations falling in each of these categories are described briefly and cross-referenced to a bibliography of 339 titles. This work serves as background for a number of types of investigations of rhythm. Particularly, it will be of service in designing studies on the influence of rhythm on various kinds of motor performance, and on the identification and measurement of one or more rhythmic abilities. Project no. 21-09-004. Contract no. AF 33(038)-10413. AAF HRRC RB 51-4.

RUBBER AND RUBBER PRODUCTS

ELASTOMER COMPOUNDS FOR HIGH-VACUUM APPLICATIONS, by J. R. Britt. U. S. Naval Research Laboratory. Jul 1951. 12p photos, diagrs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $.50. PB 104729

A compounding study using butyl, Neoprene, and butadiene-acrylonitrile-type elastomers as high-vacuum seals is presented. Elastomers compounded without carbon black and plasticizers show some slight gain in ultimate vacuum. All the elastomer compounds were proven adequate for maintaining vacuum in the range 10^{-5} to 10^{-6} mm for the rapid-pumping system used. A test for the effectiveness of a seal showed that the permeability of the rubber was the governing factor. Data obtained indicate that a more extensive investigation of the relationship between system volume, area of elastomer exposed, and pumping capacity would aid in the efficient design of improved vacuum systems. NRL R 3827.

MÖGLICHKEITEN MIT NEUEN STABILISATOREN (NEW STABILIZERS. BUNA), by Dr. Weinbrenner. I. G. Farbenindustrie A. G., Schkopau, Ger. Dec 1942. 7f (Text in German) Mi $1.25, Enl Pr $2.50. PB 100542

1. Rubber, Buna - Stabilizing agents - Germany 2. Micro BIOS FD 2234/47, Frames 1-5.

English abstract included. Abstract available as PB 100542s. 2p. Mi $1.25, Ph $1.25.

STRUCTURAL ENGINEERING

BUCKLING STRESSES OF BOX-BEAMS UNDER PURE BENDING, by Sigge F. Eggwertz. Flygtekniska Forsöksanstalten (FFA) Stockholm. 1950. 57p diagrs, graphs, tables Mi $2.75, Ph $7.50. PB 104038

A simple method is described of calculating the buckling stresses of plates with elastic restraint along the edges. This was developed from the method of moment distribution for rigid frames, and has been used at the NACA for several purposes, among others in studying box-beams with integral sections and an infinite number of cells. In this paper the latter application is extended to built up sections with an arbitrary number of cells, where the influence of the torsional stiffness of the attachments between webs and cover-skin is taken into account. One-cell and three-cell beams are thoroughly treated, and theoretical values are verified by comparison with test results. For beams with four and an infinite number of cells, the necessary formulas are given. From a number of computations of buckling

coefficients, diagrams are drawn showing the influence of different geometric ratios of box-section, and also the influence of the number of cells. Finally, buckling of plates beyond the elastic range is discussed, and comparisons are made between the reduced moduli obtained from some theories which seem to be most applicable to the case under consideration. FFA no. 33.

COMPARISON BETWEEN PLAIN AND STRINGER-REINFORCED SHEET FROM THE SHEAR LAG STANDPOINT, by M. Fine. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Oct 1941. 5p graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.40. PB 104413

1. Airplanes - Skin - Stresses - Gt. Brit. 2. Shear lag theory - Gt. Brit. 3. Shear - Distribution - Gt. Brit. 4. Stiffeners, Longitudinal - Stress distribution - Gt. Brit. 5. ARC RM 2648.

Cover date is 1951. S. O. Code no. 23-2648.

EFFICIENCY OF FLOORING NAILS, by E. George Stern. Virginia. Engineering Experiment Station, Blacksburg, Va. May 1951. 7p photo, table Available from Virginia Polytechnic Institute. Engineering Experiment Station, Blacksburg, Va. $.20. PB 104057

1. Nails, Flooring 2. VEES 78.

Bulletin of the Virginia Polytechnic Institute, Vol. XLIV, no. 4, Part B, May 1951.

GEWÖLBESTAUMAUER, BERECHNUNG EINER KREISZYLINDERSCHALE MITTELS RELAXATIONSMETHODE. (THE ARCH DAM, CALCULATION OF A CYLINDRICAL SHELL BY MEANS OF THE RELAXATION METHOD), by Othmar J. Rescher. 1951. 44p diagrs, graphs, tables (Text in German) Mi $2.50, Ph $6.25. PB 104619

1. Dams, Arch - Germany 2. Relaxation methods (Engineering) - Germany 3. Civil engineering - Calculations - Germany 4. Dokumentationszentrum der Technik.

Thesis-Technische Hochschule Wien. Abhandlungen des Dokumentationzentrums der Technik, heft 1.

INVESTIGATION OF "U" TYPE TILE-CONCRETE BEAMS, by J. Neils Thompson and W. D. Ramey. Texas. University. Bureau of Engineering Research. Jan 1947. 63p photos, diagrs, graphs, tables Available from Bureau of Engineering Research, University of Texas, Austin, Texas. PB 104499

1. Beams, Concrete - Stress analysis 2. Beams, Concrete-tile - Stress analysis 3. Tiles, Clay - Stresses 4. Beams - Tests 5. TU ERS 41.

University of Texas publication no. 4704.

METHOD OF ESTIMATING THE DIRECT STRESS CONCENTRATION ROUND HOLES IN REINFORCED SHEET, by M. Fine and Anne Pellew. Gt. Brit. Ministry of Supply. Aeronautical Research Council. May 1942. 6p diagrs, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.40 PB 104333

It was shown in Aeronautical Research Council Report No. 54551 that the accurate stress-function solution of certain two-dimensional problems of stress distribution may be replaced, with negligible error, by the approximate stringer-sheet solution. This report extends the comparison of the two methods to problems of stress concentration near holes. The stringer-sheet solution is not as accurate as before but the error in the direct stress is sufficiently low for the method to be of practical use. Cover date is 1951. S. O. Code no. 23-2604. ARC RM 2604.

ON THE STRESSES AT THE EDGE OF AN ECCENTRICALLY LOCATED, CIRCULAR HOLE IN A STRIP UNDER TENSION, by Sverker Sjöström. Flygtekniska Försöksanstalten (FFA) Stockholm. 1950. 27p diagrs, graph, tables Mi $2.00, Ph $3.75. PB 104041

This paper deals with the stress concentrations in a strip under tension containing an eccentrically located hole. The problem has been worked out in connection with an investigation concerning stress concentrations at the edge of rivet holes in stringers. FFA no. 36.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE. INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-AC-15228 (16528) PREPARED by B. D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Oct 1946. 65f photos, graphs, tables Mi $9.00, Enl Pr $86.25. PB 104463

1. Radar - Domes - Materials 2. Instruments, Erosion testing 3. Coatings, Protective 4. Materials Aircraft - Laminated 5. Sandwich construction - Core materials.

GER451 and appendices 1-29. Ref R-09-03 pt. 1-31 (including Exhibits A-N). See also PB 104464-104471.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 31) INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-AC-15228 (16528) PREPARED by B. D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Aug 1949. 17f diagrs, graphs, tables Mi $1.75, Enl Pr $3.75. PB 104465

1. Radar - Domes - Materials 2. Foams - Effect of humidity 3. Sandwich construction - Core materials.

GER 451 appx. 31. Ref R-09-03 pt. 33. See also PB 104463-104464, 104466-104471.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 32) INTERIM ENGINEERING REPORT UNDER CONTRACT NO. W33-038-AC-15228 (16528) PREPARED by B.D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Oct 1949. 11f diagr, graphs, tables Mi $1.75, Enl Pr $3.75. PB 104466

1. Foams, Chemical - Electrical properties 2. Radar - Domes - Materials 3. Sandwich construction - Core materials.

GER 451 appx. 32. Ref R-09-03 pt. 34. See also PB 104463-104465, 104467-104471.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 33) INTERIM ENGINEERING REPORT UNDER CONTRACT W-33-038-AC-15228 (16528) PREPARED by B.D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Nov 1949. 34f tables Mi $2.25, Enl Pr $6.25. PB 104467

1. Radar - Domes - Materials 2. Foams, Chemical - Electrical properties 3. Sandwich construction - Core materials.

GER 451 appx. 33. Ref R-09-03 pt. 40 and revisions to pts. 33 and 35. See also PB 104463-104466, 104468-104471.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 34) INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-AC-15228 (16528) PREPARED by B. D. Raffel and E. Duplaga. Goodyear Aircraft Corporation, Akron, Ohio. Dec 1949. 12f tables Mi $1.75, Enl Pr $3.75. PB 104468

1. Radar - Domes - Materials 2. Sandwich construction - Core materials 3. Erosion 4. Foams, Chemical - Electrical properties.

GER 451 appx. 34. Ref R-09-03 pt. 36. See also PB 104463-104467, 104469-104471.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 35) INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-AC-15228 (16528) PREPARED by B. D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Dec 1949. 20f photo, tables Mi $1.75, Enl Pr $3.75. PB 104469

1. Radar - Domes - Materials 2. Trithene (Trade name) 3. Foams, Chemical - Electrical properties.

GER 451 appx. 35. Ref R-09-03 pt. 37. See also PB 104463-104468, 104470-104471.

RADOME MATERIALS RESEARCH AND FABRICATION DEVELOPMENT SERVICE (APPX. 36) INTERIM ENGINEERING REPORT UNDER CONTRACT W33-038-AC-15228 (16528) PREPARED by B. D. Raffel. Goodyear Aircraft Corporation, Akron, Ohio. Mar 1950. 18f photos, graphs, tables Mi $1.75, Enl Pr $3.75. PB 104470

Progress made on research and fabrication of materials for radome applications is reported. Erosion testing was continued on void-free laminates coated with air-curing materials. Goodyear 23-7A coating material (air-dry type of rubber coating) appears to have excellent rain erosion resistance and to be comparable to GACO neoprene coating material. Tests of alkydisocyanate foams indicated that annealing at moderately elevated temperatures does not greatly affect the physical properties. The investigation of conductive coatings for static dissipation was continued. Dielectric measurements were made on Gates N-200-5 neoprene coating material at X-band. A photomicrographic study was made comparing void-free laminate with conventional laminate. The conventional laminate differs from the void-free type in that minute elongated voids produce opacity and large voids add to porosity. GER 451 appx. 36. Ref R-09-03 pt. 38. See also PB 104463-104469, 104471.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

C-45 G AIRPLANE ENGINEERING ACCEPTANCE INSPECTION, by Fred R. Heckerman. U. S. Air Development Force. Research Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 4p Mi $1.25, Ph $1.25. PB 104064

1. C-45G (Airplane) 2. Airplanes - Inspection 3. Oxygen systems - Tests 4. Airplanes - Oxygen system 5. Cessna Aircraft Co., Wichita, Kan. 6. AAF TSEAA MR S-2-6.

DCRDE-S2-6.

CRASH DECELERATION, CRASH ENERGY, AND THEIR RELATION TO CRASH INJURY, by Hugh DeHaven. U. S. Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1950. 16p photos, drawings, graph Mi $1.75, Ph $2.50. PB 104306

Crash energy, energy absorption by structure, and crash force are discussed; the relationship of these factors in providing protection from serious or fatal injury in survivable aircraft accidents is illustrated by theoretical cases which are compared with actual crash results. Although considerable data now is available on causes of injury among survivors of aircraft accidents, the magnitude and duration of forces occurring in crashes remain unknown. It is proposed that crash tests be undertaken to study factors now contributing to safety or injury in accidents and to provide engineering data whereby safety in survivable accidents can be increased by structural design. ONR Contract no. N6ori-264-12 with Cornell University Medical College. AAF TR 6242.

EFFECT OF MODEL SIZE ON MEASUREMENTS IN THE R.A.E. HIGH SPEED TUNNEL. DRAG OF TWO-DIMENSIONAL SYMMETRICAL AEROFOILS AT ZERO INCIDENCE, by W. A. Mair and H. E. Gamble. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Dec 1944. 15p graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.75. PB 104326

Pitot traverse drag measurements were made at zero incidence on three NACA 0015 aerofoils of different sizes. Pressures at the tunnel walls were also measured. For each aerofoil, tests were made at two different Reynolds numbers by changing the tunnel pressure. From the results it has been possible to separate the effects of varying Reynolds number and tunnel wall interference. It has been shown that the blockage corrections in current use (based on linear theory) are not large enough to equalise drag measurements made on different sizes of aerofoil at the same Reynolds number. Empirically increased corrections which bring the results into agreement have been found. The results have also shown that at high Mach numbers there is a fairly large variation of drag coefficient with Reynolds number, especially between Reynolds numbers of about 0.2×10^6 and 1.4×10^6. Cover date is 1951. S. O. Code no. 23-2527. ARC RM 2527.

EFFECT OF TAB MASS-BALANCE ON FLUTTER, by G.H.L. Buxton, G. D. Sharpe, C. Scruton, P. M. Ray and D. V. Dunsdon. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Nov 1946. 18p drawings, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 103929

1. Tail surfaces - Flutter - Gt. Brit. 2. Elevators, Aircraft - Balance - Gt. Brit. 3. Mosquito (Airplane) 4. Gt. Brit. Royal Aircraft Establishment, Farnborough, England 5. ARC RM 2418.

Cover title is 1951. Contents: Part I; Ternary tailplane - Elevator - Tab flutter, by G.H.L. Buxton and G. D. Sharpe. Part II: Experiments on the influence of tab mass-balance on flutter, by C. Scruton, P. M. Ray and D. V. Dunsdon. S. O. Code no. 23-2418

FLIGHT TESTS OF A METEOR I WITH TWO W2/B23 TURBINE ENGINES EQUIPPED WITH MODIFIED JET PIPE REHEATING, by A. D. Baxter. Gt. Brit. Min-

istry of Supply. Aeronautical Research Council. Apr 1945. 12p diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 104323

1. Meteor I (Airplane) 2. W2/B23 (Turbine engines) 3. Airplanes - Flight tests - Gt. Brit. 4. Jet engines, Turbo-jet - Performance - Gt. Brit. 5. ARC RM 2422.

Cover date is 1951. S. O. Code no. 23-2422.

FLOW SEPARATION AHEAD OF BLUNT BODIES AT SUPERSONIC SPEEDS, by W. E. Moeckel. U. S. National Advisory Committee for Aeronautics. Jul 1951. 38p photos, diagrs, graphs Mi $2.25, Ph $5.00. PB 104420

Supersonic flow against blunt bodies placed in boundary layers is discussed, and it is concluded that wedge-shaped or conical dead-air regions should form ahead of the body for some ranges of body thickness. Analysis of this type of flow indicates that a maximum body thickness exists (relative to initial boundary-layer thickness) beyond which steady wedge-type or conical separation regions cannot occur. For the range of relative body thicknesses for which wedge-type separation occurs, good agreement was obtained between experimental and theoretical pressures in the dead-air region at Mach numbers from 1.73 to 2.02. Unsteady flow was obtained for large relative body thicknesses. NACA TN 2418.

FLUTTER OF CONTROL SURFACE TABS, by G. A. Naylor. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Apr 1942. 12p diagr, graphs Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 104334

Oscillation of control-surface tabs has occurred in flight. General experience and the investigations of this report suggest that the oscillations were flutter, involving translation of the tab, arising from bending of the local control-surface structure, coupled with rotation of the tab about its hinge, arising from either backlash or elasticity of the tab controlling mechanism. Binary flutter calculations show that, for this coupling, the normal remedy, i.e. mass-balancing, is only partially effective (static mass-balancing roughly doubles the backlash flutter speed but may decrease the elastic flutter speed). If the tab controlling mechanism is adequately stiff, elimination of backlash gives higher flutter speeds than would be obtained by mass-balancing alone and in practice probably removes the danger of flutter. Flutter is completely prevented by aerodynamically balancing and dynamically mass-balancing (C.G. on hinge line) the tab. Cover date is 1951. S. O. Code 23-2606. ARC RM 2606.

FREE-FLIGHT TESTS ON KITES IN THE 24-FT. WIND TUNNEL, by S. B. Jackson. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Mar 1942. 18p photo, diagrs, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.90. PB 104332

1. Kites - Wind tunnel tests - Gt. Brit. 2. Cody kite Mk II. 3. Cody kite Mk III 4. Dyco kite 5. Haldon kite 6. ARC RM 2599.

Cover date is 1951. S. O. Code no. 23-2599.

INDUCED DRAG OF FLAPPED ELLIPTIC WINGS WITH CUTOUT AND WITH FLAPS, by A. D. Young. Gt. Brit. Ministry of Supply. Aeronautical Research Council. Feb 1942. 2p drawings, graphs, tables Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. $.65. PB 104327

Calculations have been made of the induced drag of flapped elliptic wings covering a range of aspect ratios from about 4 to about 12, a range of flap spans from 0.2 to 1.0 of the wing span, and a range of flap cut-outs from 0 to 0.6 of the wing span. The results are presented in charts in a convenient form for application. Calculations have also been made of the induced drag of elliptic wings of an aspect ratio of about 6 with flaps that extend the local chord by 40 per cent when in operation; flap spans of 0.26, 0.5 and 0.77 of the wing span were examined. It is concluded that for a given net flap span and lift increment minimum induced drag will be obtained with a cut-out of about 0.1 wing span. The effect of local chord extension due to a flap was found to be negligible. These results apply strictly to elliptic wings but they probably apply with fair accuracy to wings of taper ratio of the order of 2:1. Cover date is 1951. S. O. Code 23-2544. ARC RM 2544.

INFLUENCE OF TENSILE STRENGTH AND DUCTILITY ON STRENGTHS OF ROTATING DISKS IN PRESENCE OF MATERIAL AND FABRICATION DEFECTS OF SEVERAL TYPES, by Arthur G. Holms, Joseph E. Jenkins and Andrew J. Repko. U. S. National Advisory Committee for Aeronautics. Jun 1951. 25p photos, tables, diagrs Mi $2.00, Ph $3.75. PB 104245

The influence of tensile strength and ductility on disk strength was investigated with material and fabrication defects present. In two cases an optimum compromise between tensile strength and ductility occurred at a ductility less than 15 percent elongation. In a third case, no influence of ductility was observed. When compared with performance previously observed for disks not containing irregularities, losses in disk strength for the defects investigated varied from 23 percent to 58 percent. NACA TN 2397.

INTERMITTENT FAULTS IN 120/208-VOLT A-C AND 120-VOLT D-C AIRCRAFT ELECTRICAL SYSTEMS, by P. E. Toomire and M. Trbovich. U. S. Naval Research Laboratory. May 1951. 29p diagrs, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $.75. PB 104107

The results of the investigation of faults on a simulated 120/208-volt, 400-cycle aircraft electrical system show that, of the 225 faults established, approximately five percent developed into welded faults, while the remaining 95 percent were of the intermittent type. The fault-current magnitude is primarily determined by the contact resistance and the arc resistance in the external circuit, and the subtransient reactance of the generator. It is believed that the intermittent fault usually begins by fault-current flow in excess of the capacity of the contact strands. This results in melting these strands, causing separation of the faulted conductor and the grounded plate. The duration of the first fault pulse for 98 percent of the intermittent faults was less than 0.01 second. No correlation was observed between structure vibration and the first-fault-pulse duration, but faults established on a vibrating platform usually last longer and result in more welds than faults established on a stationary platform. Damage to the grounded structure from intermittent faults is less in the 120/208-volt, 400-cycle system than in either the 30-volt or 120-volt d-c systems used in this investigation. Although the current is greater in the a-c faults, the arc dura-

tion is much shorter than the duration of intermittent faults on a 30-volt d-c system. Samll values of effective current are obtained when considering duration over several fault pulses. The results of the investigation of faults on a simulated 120-volt d-c aircraft electrical system show that, of the 180 faults established, approximately 91 percent resulted in intermittent-type faults. It has not been possible to correlate the fault-current magnitude with structure vibration. It is concluded that the resistance of the contact and the arc resistance will primarily determine that fault-current magnitude for a particular system with a given fault-circuit resistance. NRL R 3819.

MISCELLANEOUS

AERO MEDICAL PRODUCTS, INC. CONTINUOUS FLOW OXYGEN MASK LR 30, by Elizabeth Comfort. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1951. 5p photo, table Mi $1.25, Ph $1.25. PB 104593

1. LR30 (Oxygen mask) 2. Respirators, Oxygen generating - Tests 3. Aero Medical Products, Inc. 4. AAF TSEAA MR 696-107K.
MCREXD-696-107K.

COMPARISON TEST OF MAGNESIUM ALLOY AND FIBERGLASS SEAT PANS, by H. F. Holton. U. S. Air Materiel Command. Engineering Division. Aero-Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1951. 3p Mi $1.25, Ph $1.25. PB 104594

1. Kits, Aircraft - Survival - Equipment - Tests 2. Seats, Parachute - Materials - Tests 3. AAF TSEAA MR 670-21U.
DCRDM 670-21U.

JAPANESE WILDLIFE ADMINISTRATION, by Cleland N. Feast. Supreme Commander for the Allied Powers. Natural Resources Section. Jun 1951. 46p diagrs Mi $2.50, Ph $6.25. PB 104630

1. Game laws - Japan 2. Wildlife - Conservation - Japan 3. SCAP NRS PS56.

MILITARY STANDARD: NONDESTRUCTIVE TESTING SYMBOLS. U. S. Munitions Board Standards Agency. Nov 1950. 8p diagrs, tables Available from Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. $.15. PB 104580

1. Symbols 2. Testing and standardization - Symbols.
MIL-SID-23.

PROCEEDINGS, UNIVERSITY OF MICHIGAN, SEP 11-13, 1950. Conference on the Administration of Research, 4th, 1950. 1951. 101p photo, graphs Available from Engineering Research Institute, University of Michigan, 311 Maynard St., Ann Arbor, Mich. $3.00. PB 103446

1. Research - Congresses.
Contents: 1st session. Calculated risk, by Thomas H. Vaughn, E. D. Reeves, Donald H. Loughridge. - 2d session. Measuring the return from research, by Allen Abrams, W. S. Parsons, C. G. Suits. - Dinner meeting. Engineering research in modern corporations, by James C. Zeder. - 3d session. What is needed in a research executive, by John C. Flanagan, Albert A. Lombard, Jr., Raymond Stevens. - 4th session. Overhead as a factor in sponsored research, by W. K. Pierpont. - 5th session. New government services to research: The National Science Foundation and research, by Thomas J. Killian. - Federal housing research program, by Richard U. Ratcliff. - Research for small industries, by John C. Green. - Summary of addresses and discussions, by Eric A. Walker.

REVIEW OF CURRENT RESEARCH AND DIRECTORY OF MEMBER INSTITUTIONS. American Society for Engineering Education. Engineering College Research Council. Mar 1951. 249p Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $2.25. PB 103947

1. Scientific research - Institutions - Directories 2. Scientific research 3. Engineering research 4. Research.

SCOTT 8600 "ECONO-MASK": PERFORMANCE AND EFFICIENCY TEST, by Stanley S. Wehling. Scott Aviation Corporation, Lancaster, N. Y. Mar 1951. 18p photos, drawing, graphs, tables Mi $1.75, Ph $2.50. PB 103867

1. Respirators, Oxygen generating - Disposable - Tests 2. 8600 "Econo-Mask" (Oxygen mask).
Report no. 405.

SOURCE, TRANSPORTATION AND DEPOSITION OF BEACH SEDIMENT IN SOUTHERN CALIFORNIA, by John W. Handin. U. S. Beach Erosion Board. Mar 1951. 127p maps, graphs, tables Available free from the President, Beach Erosion Board, Corps of Engineers, 5201 Little Falls Road, N. W., Washington 16, D. C. PB 103919

1. Sediment - Deposition 2. Sands, Beach 3. ENG BEB TM 22.
Thesis - University of California, Los Angeles, Calif.

STUDY OF SOME MECHANICAL FOAMS AND THEIR USE FOR EXTINGUISHING TANK FIRES, by R. L. Tuve and H. B. Peterson. U. S. Naval Research Laboratory. Aug 1950. 92p photos, diagrs, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. Mimeo: $2.50. PB 103775

Mechanically formed fire-fighting foams have been produced and studied on a laboratory scale using a standardized type of proteinaceous foam-forming concentrate containing multivalent metallic salts and polypeptides exhibiting film strength transformation in the presence of heat. Empirically devised testing methods and foam-generating equipment have been utilized in an attempt to correlate petroleum fuel fire extinguishing ability of variable air-water composition foams with certain of their physical characteristics capable of variation, such as fluidity, water drainage rates, and water content. The results obtained when these foams are introduced to fires in tanks by commonly used surface application methods are compared with those obtained when a relatively new technique (subsurface injection) is employed to inject foam into the bulk of the fuel at the base of the tank by means of the oil product line or other protected conduit. NRL R 3725.